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# ***JPRS Report***

# **Science & Technology**

## ***USSR: Science & Technology Policy***

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# SCIENCE & TECHNOLOGY

## USSR: SCIENCE & TECHNOLOGY POLICY

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## ORGANIZATION, PLANNING AND COORDINATION

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### MARCHUK ON REORGANIZING ACTIVITY OF ACADEMIC INSTITUTIONS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 3-13

[Speech by President of the USSR Academy of Sciences Academician G.I. Marchuk at the field meeting of the Presidium of the USSR Academy of Sciences and the Council for the Coordination of Scientific Activity of the Academies of Sciences of the Union Republics, in Vladivostok, under the rubric "In the Presidium of the USSR Academy of Sciences": "Reorganizing the Scientific Activity of Academic Institutions in Light of the Decisions of 27th CPSU Congress"; first paragraph is VESTNIK AKADEMII NAUK SSSR introduction; passages within slantlines published in italics]

[Text] The field meeting of the Presidium of the USSR Academy of Sciences and the Council for the Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics was held on 26-28 November 1986 in Vladivostok. The problems of reorganizing the operation of the USSR Academy of Sciences and the academies of sciences of the union republics in light of the decisions of the 27th CPSU Congress, which set the task of shifting the country's economy to an intensive path of development, were examined at it. The state and prospects of development of science in the Far East were also discussed. Representatives of academic institutions and VUZ and sectorial science and party and economic executives of the krais and oblasts of the Far East were invited to the meeting. The report which President of the USSR Academy of Sciences Academician G.I. Marchuk presented is published below.

The Communist Party and Soviet people are performing intensive work on the implementation of the concept of accelerating the country's socioeconomic development on the basis of scientific and technical progress, which was advanced by the April (1985) the CPSU Central Committee Plenum and the decisions of the 27th party congress. The present period is characterized by profound qualitative transformations in our society. Great success has been attained in solving social problems, the social atmosphere has improved, organization and labor discipline are increasing, and at the same time democratization and openness are being expanded. More opportunities for applying creative undertakings and the initiative of the Soviet people are being afforded. The reorganization taking place in the country is having a beneficial effect on all spheres of the life of society.



Science has an important role in the comprehensive development of our society and in the further growth and effective use of its powerful technical and intellectual potential. Basic research, on whose basis essentially new technologies and materials are being created, is of decisive importance in strengthening scientific and technical progress and, consequently, sharply increasing the technical level of production, the productivity of social labor, and product quality. In many directions the level of domestic science surpasses the world level, but there are also such directions in which we have given up the leading positions. How did this happen?

It should be admitted that the extensive development of both the economy and science had the result that science has not received from production orders that would have promoted the expansion of basic research in the necessary direction and at the necessary rate. Consequently, the growth of basic research slowed down for some time, and academic science and VUZ science dealt with the production materialization, which is not characteristic of them, of their own developments which the national economy needed. Meanwhile sectorial science should have been occupied with this generally useful work. But sectorial science turned out to be unprepared for rapid reorganization of its scientific research and production potential on the basis of the new data of basic research, even though approximately 90 percent of all the allocations, which are being channeled into science, go to sectorial science and less than 10 percent go to basic research. Thus, between academic and sectorial science there was no harmonious combination, in case of which academic science should find the object of research and at its early stage should associate with sectorial science so that the latter, by using its powerful potential, would implement the results of basic research.

The decisions of the 27th CPSU Congress specified that the main task of the USSR Academy of Sciences is the development of basic research. Of course, the activity of the academy should not be limited to this task alone. Basic research is necessary as a base for developing all sciences and should culminate in essentially new ideas for machines, technologies, and materials. Thus, innovations within the framework of laboratory embodiments and "test tube" technologies, which have been developed by academic science, should in the end be implemented with the aid of sectorial science. Such is the formula that was, is, and will be basic for determining the role of academic science and its effect on the national economy.

The necessity of increasing the Academy of Sciences's responsibility for developing the theoretical principles of fundamentally new equipment, technologies, and materials requires the organizational restructuring of its activity in light of the consolidation of the basic unit of academic science. It is necessary to increase the level of basic research and attain the leading levels of world science, to expand and intensify the work in priority directions, and to raise the quality and efficiency of research. It is also necessary to concentrate scientific forces and material resources in those directions that effectively influence the acceleration of scientific and technical progress and the economic, social, ideological, and cultural development of society.

We must accomplish one complex task: change over from the extensive to the intensive means of developing science. This transition forces us to look in a new way at the topics of the organization, planning, and coordination of research, the manpower, material, and technical supply of academic, VUZ, educational, and sectorial science, and the question of the management of science.

The Basic Directions of USSR Economic and Social Development for 1986-1990 and Period to 2000 give a clear guideline for the development of scientific research: during the 12th Five-Year Plan the time of experimental design development should be shortened to one-fourth to one-third. This means that design bureaus and sectorial scientific research institutes should be "to the surface" threefold more products--implemented technologies, new materials, new technical solutions--than during the 11th Five-Year Plan. But so that they would do this, they need a good reserve from basic science because all large, revolutionizing achievements have fundamental sources. Thus, basic science must sharply increase the rates of its developments and influence sectorial science more actively. This in turn will require the substantial improvement of the supply of scientific institutions with advanced instruments and equipment, computer hardware, automation and office equipment, as well as great efficiency in material, technical, and information supply.

Guided by this generalized criterion for the development of scientific research, we must also develop a program of the material resupply and retooling of the Academy of Sciences, which would ensure during the 12th and 13th Five-Year Plans a high rate of scientific development and the rapid response of academic institutes to possible changes in science, technology, and engineering and would lay the foundation for extensive basic research. And, of course, a purposeful, fully efficient creative labor of the collectives of the scientific institutions will be the decisive link here.

The Academy of Sciences must also accomplish the vitally important task of rapidly transferring the results of research and development to production. Considering science's ever-increasing responsibility for social production, cooperation with the sectors of the national economy should be organized at the early stage of scientific research. It should conclude with the transfer of ideas to sectorial science while directly and continuously monitoring the progress of the implementation of one development or another up to its use in the national economy. The need to evaluate the trends that arise in industry when innovations are introduced will require the organization of feedback--from industry to science. Practice shows that if the scientific level of a development and its design and technological analysis are reinforced by the economic interest of production, the implementation of the results of scientific research leads more rapidly to the output of the new product.

We have long waited for science to be fundamentally and actively accepted by the entire national economy. We understood that the means of extensive development has a limit, and in fact it appeared 5 years ago. The means of extensive development is the means of the directive plan. At one time such planning made it possible to draw all the resources we had into the sphere of social production. This was a significant advantage in the development of our economy. Now a new task has been posed: to combine the plan with initiative,

to change over to advanced production technologies, and to attain the world level of produced equipment and scientific developments. In a word, the intensive means of development requires smaller volumes of production, but its greater intellectualization and science-intensiveness. It is precisely for this reason that the attitude toward scientific developments and technology is changing in a fundamental manner.

To change the economy over from the extensive to the intensive means of development, the party and government conducted a number of experiments connected with improving the economic mechanism, the results of which have now been formulated into a new concept for accelerating the scientific development of our country. This concept provides for changing all enterprises of the national economy over to full cost accounting, self-supporting production [samookupayemost], and self-financing. The profit is becoming the sole generalized criterion of enterprises' activity, precisely the profit makes it possible to form production development funds of enterprises for scientific and technical transformations, material incentive funds, and funds for housing and municipal residential construction. In general, the profit serves as a real source of a collective's life and as a characteristic of its labor activity.

Under current conditions, given the new economic mechanism, it is possible to obtain a profit only by using production automation, the latest technologies and materials, or new principles of developing equipment and technology. Thus, without having solved the fundamental problems of scientific and technical progress, of which basic scientific research constitutes the basis, it is impossible to continuously obtain a profit and produce competitive products.

The 12th Five-Year Plan is actually a five-year plan of machine building, since the comprehensive retooling of the fixed capital of production has to be accomplished. It is thus no accident that machine building became the core of the country's economic development in the current five-year plan. The main thing, however, is that 80-90 percent of the output of the machine building sectors, which are of the greatest national economic importance (mass production or unique equipment), should become competitive on the world market by 1990. This can only be done by using the latest achievements of science, engineering, and technology in scientific research and experimental design developments. In a word, the prerequisites for the closer union of scientific and technical potential with the production potential are now being created.

In order to raise the activity of the Academy of Sciences to the level of the requirements of today, it is necessary to expedite the work on the reorganization of academic science and its interaction with VUZ and sectorial science. This reorganization is being conceived in four basic directions.

1. The improvement of the forecasting and planning of scientific research and the concentration of efforts on the most urgent directions.

2. The elimination of the excessive centralization of management, the broadening of the powers and rights of departments, the creation a dynamic, flexible structure of institutes, and the increase of their independence.

3. The radical improvement of the coordination of scientific research in the system of academic, VUZ, and sectorial science on the basis of the most important all-union programs and operations of the basic level.

4. The improvement of personnel policy and the attraction of talented youth.

To ensure the efficient planning and specification of priority directions, it is above all necessary to analyze thoroughly and comprehensively and in a demanding and self-critical manner the state and results of scientific research in each branch of knowledge and at each scientific institution. This analysis should be accompanied by effective measures on developing the most important scientific directions.

In the near future the Presidium jointly with the departments of the Academy of Sciences will a list of the most important directions in science and technology, moreover, we should have our forecasts of their further development in order to maintain leading positions in those lines of research where we have attained them and to attain quickly the world level in the others. The forecast will clearly specify the guidelines and means by which the leading levels in basic research will be attained.

After the Presidium of the USSR Academy of Sciences approves this list, the formulation of programs of basic research for the next three to four five-year plans will begin. In essence, all-union programs of the development of basic research with a clear orientation toward those revolutionary innovations that will result in new technologies and materials and new machine designs will be developed. Thus, the basic directive of the 27th CPSU Congress concerning the fact that the Academy of Sciences should become the integrator of all fundamental directions of science will be fulfilled.

There are many excellent examples of creative initiatives in organizing research in the Academy of Sciences, but a lot of routine, paperwork, bureaucratic habits and procedures, disorganization, and irresponsibility still exist. In October 1986 the General Assembly of the USSR Academy of Sciences, in discussing the problems of reorganizing all the activity of the academy, focused basic attention on /increasing the role of its departments/. The departments have been charged to formulate proposals on expanding their powers in supervising scientific institutions. The Presidium then generalized and discussed these proposals with the executives of the departments. As a result it was deemed necessary to increase the role and responsibility of the departments, which should become not only scientific, but also organizational centers, which unite scientists and scientific institutions in the system of the USSR Academy of Sciences according to branches of knowledge regardless of departmental subordination.

Precisely the departments of the Academy of Sciences should ensure the leading development of basic research, on which the acceleration of scientific and technical progress depends, create the conditions for the successful solution

of vital questions and long-range problems of the economic, social, and spiritual development of society, and actively promote the introduction of the results of scientific research in the national economy and all spheres of our country's life.

So that the departments would have the real opportunity to realize a guiding role in the development of the corresponding branches of science and to allocated resources for the research which particularly needs them, substantial decentralization of management was required: many functions, which were previously performed by the Presidium of the Academy of Sciences, were turned over to the departments.

It should be noted that at one time centralized management of science was a correct practice, the Academy of Sciences was not as large, and it was possible at the right moment to maintain and aim emerging trends in the necessary direction. Now, however, the the situation is different: at the USSR Academy of Sciences alone there are 250 institutes, there are almost the same number of academic organizations of the union republics, higher educational institutions, and so on. It is impossible to manage in a centralized manner the extremely enormous potential of basic science. It is precisely for this reason that the idea of decentralization, but decentralization without the loss of the global management of science by the staff of the Presidium, arose in the Presidium of the Academy of Sciences. It needs to focus attention on the questions of the structure of management and the coordination of intersectorial, interdepartmental problems. Thus, the specialized departments settle all questions on the management of science, which are connected with their competence, while the highest unit--the Presidium--is responsible for the coordination of scientific research and and the prospects of development of science in the country.

In the decree of the Presidium of the USSR Academy of Sciences of 12 November 1986 provision is made for the transfer to departments of powers on the approval of the basic directions of basic research in the corresponding field of science; the organization and coordination of operations, including on complex intersectorial problems in the system of academic, VUZ, and sectorial science; the implementation of personnel policy; the determination of the needs for and the distribution among the scientific institutions, which are under the jurisdiction of the given department, of staff, financial, material, and technical resources. Powers in the area of planning and organizing international scientific cooperation are also being turned over to the departments. The department will have a bank account and will in reality coordinate that science for the development of which it is responsible.

The Presidium approved the Temporary Model Statute on the Department of the USSR Academy of Sciences, which was drafted on the basis of the proposals of the departments and will be submitted for the approval of the General Assembly of the Academy of Sciences in March 1987. Inasmuch as the changes relating to the powers, rights, and duties of the departments are of fundamental importance, I will dwell on them in greater detail.

In the system of the Academy of Sciences the department is becoming the basic scientific organizational center which unites scientists of one or several

branches of science. It is called upon to ensure the development of basic scientific research, the solution of long-range economic and social problems, and the priority of domestic science, and to promote the introduction of the achievements of science into practice. The department's responsibility for the contribution of the corresponding branch of science to solving the problems of the socioeconomic and spiritual development of society, as well as for the use of the resources allocated to the department for developing science was established. Now the department has specific levers to focus its activity on accomplishing most urgent tasks of science or its applications.

The department's tasks have been expanded considerably. The formulation of scientific forecasts and the basic directions of basic research with respect to the specialization of the department with allowance made for the achievements of world and domestic science and practice is among the most important ones. Whereas this was previously the competence of the Presidium of the Academy of Sciences, now it will now only approve scientific forecasts and statewide generalized plans, inasmuch as they include an integrated set of measures that are connected with the work of not only departmental organizations, but also the academies of sciences of the union republics and VUZ and sectorial science.

The approval of five-year plans of the scientific research work of scientific institutions, as well as the basis assignments for annual plans is a new function for the departments.

The departments will also carry out the scientific methods supervision of the country's scientific institutions in the corresponding areas of science and will assume the role of the leading coordinating center for complex intersectorial problems in the system of academic, VUZ, and sectorial science. For this the department approves the basic directions and plan of the coordination of scientific activity and takes it through the scientific councils and corresponding institutes. The department will establish contacts directly with state organs and economic and social organizations for the problems of the coordination of scientific and technical issues and the use of scientific achievements in practice.

In addition, all resource supply will be strictly regulated and centralized, and proposals about the resource, financial, personnel, and other levers will be concentrated in the Presidium of the Academy of Sciences, which will cooperate with the Gosplan, State Committee for Science and Technology, and Council of Ministers. Consequently, centralization will be maintained at the level of overall cooperation between the Academy of Sciences and state organs.

The Temporary Model Statute provides for the increase of the concern of the department for the scientific institutions subordinate to it. Precisely the department will now periodically check the activity of its institutions and specify priority directions, readjusting the work if necessary or changing the structure of scientific institutions.

It is deemed advisable to approve for the entire five-year plan for each academic institute the standards of the size of the staff and the wage, material and technical resources, and so on. These standards can be changed

only as a result of complex audits. If the audit establishes that certain scientific directions have lost their urgency or that a certain laboratory is not fulfilling its functions and is marking time, then based on the recommendations of the directors of the complex audit the institute may be deprived of part of the material and financial resources. The freed assets are transferred to the department, which redistributes them among the organizations at which active work is under way.

The overall supervision of personnel policy, the disposition of material and financial resources, the supervision of publishing activity, and the accomplishment of international scientific contacts in its specialization are included in the sphere of activity of the department.

The new tasks also determine the new functions of the department. For example, the department will deal with the development of the network of scientific institutions, the improvement of the form and methods of conducting complex scientific research, the selection and placement of management personnel, and the determination of the staff size of an institution (within the established limit) with allowance made for the change of scientific problems. The department has also been charged with confirming deputy directors of institutes for scientific work and scientific secretaries, the composition of scientific councils of institutes and problem scientific councils, certification councils with subsequent inclusion on the Higher Certification Commission, and the editorial boards of scientific journals under the department.

In accordance with the Temporary Model Statute, the department distributes the total amounts of expenditures for scientific research work among its scientific institutions, establishes the needs for material and technical supply of the scientific institutions, including computer hardware and means of the automation of scientific research, monitors its use, and allots to the institutes annual limits and numbers of pages of scientific publications.

These are only some of the more important of the new rights and responsibilities now given to departments of the Academy of Sciences. It is unquestionable that the increase in the departments' role, which has been stipulated by the decree of the General Assembly of the Academy of Sciences, will be placed on a real, practical basis. This transformation will enable us to objectively manage science and to answer objectively for the development of its basic directions. The qualitative aspect of the departments' work will also become obvious. If, thanks to its organizational activity, a department has brought the directions of research up to highest world levels, this means that it is operating well. The maintaining or leading of the world level of the development of science in its basic directions will be the main criterion of work of the departments.

In accordance with the decree of the Presidium of the USSR Academy of Sciences, the departments will begin work according to the new structure in January 1987. It should be hoped that the reorganization of the work of the departments of the Academy of Sciences will be justified and will yield positive results. Of course, it will be necessary to endure a little pain since the departments' staff has still not completely adapted to their new

functions. The post of deputy academician secretary for organizational work is being introduced. This is a post of a freed worker on the level of a doctor of sciences or corresponding member (it varies in different departments) who is should supervise the staff, ensuring the increase of the organizational efficiency in settling questions.

The next unit of reorganization is the /structure and activity of the scientific institutions/. At institutes science is born and the methodology of scientific research is formulated. If we attain from institutes flexibility, the increase of independence and scientific responsibility, and quick response to changing processes in science, we will have made the reorganization a tool for increasing the effectiveness of basic scientific research. In the near future the Presidium of the USSR Academy of Sciences will have to revise the Model Statute on the Scientific Research Institute, which is aimed at the further improvement of the organization of science.

During the reorganization it is necessary to bear in mind that the USSR Academy of Sciences and the academies of sciences of the union republics are organizations that are rather conservative in the structural sense. Conservatism has penetrated the scientific subdivision so far that we are now becoming slaves of the structures and the traditions, including negative ones, that have accumulated over decades. The main danger is the ossification of organizational structures in the institutes, which has in some cases led to a break between managers and the real situation in the collective. And the attempt of youth to break loose from this situation has sometimes ended in expulsion from the institute. As a rule, the department director prevents his staff member from transferring to another department or research collective. For some reason, this is considered a disgraceful or amoral act.

Meanwhile, the entire world has changed over to flexible collectives and competitive solution of organizational problems. If new scientific problems arise, then a collective made up of institute staff, to which outside specialists may also be attracted, quickly formulates solutions for them. There is no such mobility in Soviet institutions, but at least at academic institutes we should create conditions for the rapid transfer of personnel.

I will try to formulate principles on the basis of which the board of directors, scientific councils, and the entire community should reorganize the work of institutes so that they would react more quickly to innovations and creativity and take the interests of youth into account, which would enable an institute to work more actively on problems of cardinal importance.

The first principle is the continuous replacement of the personnel of an institute. Analysis shows that 4-5 percent of personnel at the institutes of the Academy of Sciences changes naturally: retirement, transfer to another job, and so on. Obviously, the standard of the annual replacement of personnel of any scientific institution, which is proposed by the Presidium of the Academy of Science, should be 5 percent. This means that each year an institute is obliged to include 5 percent young specialists, including graduate students, on its staff. If an institute does not do this, the Presidium will consider that its board of directors is not carrying out one of its main tasks in the work with personnel. If 5 percent young specialist join



the institute's staff each year, the replacement of the entire staff will occur in approximately 20 years. Its median age of the staff will correspond to the period of most productive work of the scientist.

The second principle is the change of the structure of the institute, which envisages the replacement of one-quarter of the composition of the structural subdivisions per five-year plan. This means that each department or laboratory must solve the problem facing it in four five-year plan. Evidently, 20 years is the maximal time span for solving a scientific problem, in this period new problems and new tasks should arise for departments and laboratories. Of course, a 25-percent replacement of the composition of a scientific subdivision is not strictly obligatory. The standard may differ in different branches of science, but it is necessary to introduce them, otherwise we will not cope with this ossified mechanism.

In light of the reorganization occurring in the sphere of science, /coordination of scientific research/ is acquiring great importance. It needs serious improvement. The departments as the scientific organizational centers of the academy should become the basic unit in the coordinating activity of the USSR Academy of Sciences.

The Council for the Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics, which organizes discussions on the fundamental issues of developing science in the union republics, is operating productively within the framework of the USSR Academy of Sciences. However, a trend, which we should consider, has become evident: the gradual separation of the activity of the academies of sciences of the union republics from the activity of the USSR Academy of Sciences is occurring. At one time, when the academies of sciences of the union republics were weak, they sent a rather large number of specialists to graduate and doctoral studies at the country's leading academic institutions. Thanks to this, scientific schools renowned throughout the world appeared in many union republics about 20-30 years ago. Gradually, however, the academies of sciences were consolidated, became increasingly stronger in a scientific sense, and at some moment became reserved. The reproduction of candidates and doctors of sciences primarily or entirely locally began, isolation from the general tasks of developing basic research in the country emerged. As a result, many directions of scientific research deteriorated at the academies of the union republics.

Of course, when the academies of sciences of the union republics were becoming strong, the USSR Academy of Sciences did not find new forms of integration and cooperation to make interaction with them more productive. Furthermore, the academies of sciences of the union republics did not display initiative in the exchange of specialists, preferring to "brew" their own science themselves. Consequently, there was a bilateral underestimation of so very important a factor in the activity of scientific institutions as cooperation.

If the situation does not change, many (possibly even half) of the academies of sciences of the union republics will go over to the category of regional sectorial organizations. Unfortunately, this dangerous trend has been observed. To keep this from happening, the USSR Academy of Sciences should quickly reorganize the coordination of research in the area of the natural and

social sciences and create favorable circumstances in the union republics for a sharp increase in the level of scientific research in many directions of science.

The Presidium of the USSR Academy of Sciences is proposing also to hold in the future field sessions of the Council for the Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics not less than once each year. But the main thing is that it is proposed to organize under this council 17 coordinating sections, one for each of the departments of the USSR Academy of Sciences, which will simultaneously be coordinating councils of the departments, academician secretaries of the departments should head them. They will include the directors of the corresponding sections of the academies of sciences of the union republics and representatives of VUZ and sectorial science. If only once a year these 17 sections (coordinating councils) should arrange discussions of important complex questions, at which problems related to the development of basic science will be solved in a business-like manner.

The Presidium of the USSR Academy of Sciences believes that it is necessary to have a unified plan of the training and advanced training associates of the USSR Academy of Sciences and academies of sciences of the union republics. So far such plans have been drawn up by each academy independently. This has led to the splitting of the total scientific potential into a large number of unequal parts. It has been proposed to reestablish doctoral studies at the Academy of Sciences and to consolidate special-purpose graduate studies, that is, the training of highly skilled personnel for the union republics will become one of the main units in the coordination of the priority directions of science, which are being developed.

It is very important to specify the directions of specialization of the academies of sciences of the union republics and to provide the maximum assistance in the development of precisely these directions, in order to bring them up to the level of world science. It is necessary to create such a situation so that at each republic academy there would be two to three directions of scientific research, about which the entire world would know, the others should provide food for VUZ and sectorial science. Such a situation has already formed at several republic academies--the Ukrainian, Belorussian, Armenian, and others. They have their own face in science, and their research is as highly rated as that done at the USSR Academy of Sciences.

We are proposing every year prior to the General Assembly of the USSR Academy of Sciences to acquaint the members of the union and republic academies of sciences with the progress of Soviet science. The results of the work of the corresponding departments of the republic and union academies will be summarized in the coordinating sections. The collective discussion of the results of the work will make it possible to filter out the best thing that was done at the academies, to support advanced initiatives, and to make critical comments. These materials will be distributed before the General Assembly of the Academy of Sciences together with the accountability report of the Presidium of the USSR Academy of Sciences.

The academician secretaries of the corresponding departments of the republic academies and specialists, who are members of these departments, should be invited without fail to the general assemblies of the departments of the USSR Academy of Sciences for the discussion of questions of the development of scientific research. Specialists from the Soviet republics should also be invited to the meetings of the bureaus of departments of the USSR Academy of Sciences. It would not be a bad idea for specialists from the USSR Academy of Sciences also to attend the general assemblies of departments in the union republics.

Finally, it is proposed to establish a unified system of information supply of the USSR Academy of Sciences and the academies of sciences of the union republics according to the principle of differentiation in conformity with the scientific themes of departments. Inasmuch as common scientific problems are being worked on at all the academies, it is necessary that publications about this research be presented in the same publications. Then there will be a real competition of scientific ideas. The plans of publications should be carefully considered and the integrating principle in them should be strengthened.

It is advisable to have expert groups of the USSR Academy of Sciences made up of members of departments in certain ministries (by agreement). They could coordinate the activity of the ministry and academy, take part in compiling joint plans of work, and be enlisted in the work of the collegium of the ministry. Such cooperation would be especially useful at the stage when an important scientific development is entering industrial implementation.

In connection with the broadening of the functions of the Council for the Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics, it should include (by agreement) the USSR Minister of Higher and Secondary Specialized Education, the USSR Minister of Education, and the presidents of all specialized academies. Then we will expand the competence of the council and go beyond the framework of purely academic problems. For the task of the USSR Academy of Sciences is not only to develop scientific research in the country but also to train personnel capable of continuing this research. Mutual understanding with sectorial academies, which has not been entirely attained thus far despite all the efforts of the USSR Academy of Sciences, will also be improved.

/Improving personnel policy/ is an essential direction in the reorganization. The main thing here is the training, support, and promotion of creative scientific personnel, the correct combination of young and mature experienced scientists, the objective evaluation of the results of scientific activity, and the corresponding stimulation of each worker. And much that is correct was said about this at the General Assembly of the USSR Academy of sciences in October 1986 in the speech of Ye.K. Ligachev and in other statements.

I will recall that on 12 May 1962 the CPSU Central Committee and USSR Council of Ministers adopted a decree concerning the fact that people over the age of 65 can hold scientific organizational positions in our country. Exceptions could be allowed with special permission of the Presidium of the USSR Academy of Sciences. This correct principle, which, strictly speaking, has been made

the basis of the activity of all organizational forms of science in foreign countries, has not been implemented in our country. As a result, at many institutes where the directors have been in their positions too long, losing perspective of the institute's development, the spirit of innovation and creative activity has actually been lost. I think that this age norm, which at one time was deemed optimal, should be reestablished at academic organizations.

In the immediate future, when the promotion of scientific associates, who have a doctor of sciences degree exclusively, to the posts of director, deputy director, and head of a department, laboratory, and section is envisaged, the decree will already have been strictly implemented. Exceptions will only be made for corresponding members of the USSR Academy of Sciences and academicians as specialists of the highest skill, which requires significantly greater output. The proposal to enable corresponding members and academicians also to be promoted to the post of institute director between the ages of 60 and 65 and to fulfill their functions until the expiration of a 5-year period is being discussed. Then the academician, who had exhausted the age qualification as director, but who has great services to science and the institute, will have the opportunity to become scientific supervisor of the institute or honorary director. This honorary post fully corresponds to the prestige and services of an academy member. In so doing we hope that scientific supervisors and honorary directors of institutes will keep all the privileges that they had in the post of director. Of course, all these proposals of the Presidium of the USSR Academy of Sciences require careful examination and discussion.

It is also advisable to establish an age qualification for members of the Presidium of the USSR Academy of Sciences, after the exhaustion of which he could become an adviser to the Presidium with the right of a deliberative vote.

In accordance with the Charter of the USSR Academy of Sciences, the academicians and corresponding members will have as before departments, laboratories, or working groups according to their desire, as well as will head scientific councils, committees, commissions, and so on.

For the purpose of systematically reinforcing scientific institutions with talented youth, the Presidium of the USSR Academy of Sciences is proposing to establish a specific annual quota for each institution for the purpose of hiring the best graduates of higher educational institutions and graduate studies.

A flexible, informal approach to personnel policy will make it possible to find the principles on which the reorganization of the activity of the USSR Academy of Sciences and the transition of science to the path of intensive development should be based. I will emphasize once again that the proposals of the Presidium of the USSR Academy of Sciences, which concern the work of the academies of sciences of the union republics and institutes and personnel

policy, require serious modification, in which all representatives of the USSR Academy of Sciences and the academies of sciences of the union republics should participate.

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## FACILITIES AND MANPOWER

### ORGANIZATIONAL, PERSONNEL CHANGES AT USSR ACADEMY OF SCIENCES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 138-140

[Article under the rubric "News Items and Information": "Scientific Organizational Decisions of the Presidium of the USSR Academy of Sciences"]

[Text] An affiliate of the Informatics Problems Institute of the USSR Academy of Sciences (with a pilot works) has been organized in Orel. The performance of basic and applied research on the development of sets of peripheral equipment for personal computers was approved as the basic direction of the activity of the affiliate.

The Design Automation Institute of the USSR Academy of Sciences has been organized on the basis of a number of laboratories of the Scientific Council of the USSR Academy of Sciences for the Complex Problem "Cybernetics." The scientific and scientific methods supervision of the institute has been assigned to the Information Science, Computer Technology, and Automation Department of the USSR Academy of Sciences. The basic directions of the Design Automation Institute of the USSR Academy of Sciences were approved.

The duties of director and organizer were assigned to Academician O.M. Belotserkovskiy, chairman of the Scientific Council of the USSR Academy of Sciences for the Complex Problem "Cybernetics."

The Problems of the Superplasticity of Metals Institute [IPSM] of the USSR Academy of Sciences with a design and technological bureau and a pilot works has been organized in Ufa. The basic directions of the institute's scientific activity were approved, and its scientific and scientific methods supervision was assigned to the Mechanics and Control Processes Department of the USSR Academy of Sciences. Doctor of Technical Sciences O.A. Kaybyshev has been appointed director and organizer of the Problems of the Superplasticity of Metals Institute of the USSR Academy of Sciences.

An affiliate of the Machine Science Institute imeni A.A. Blagonravov of the USSR Academy of Sciences has been organized in Leningrad. The basic directions of its scientific activity have been approved. Doctor of Technical Sciences V.P. Bulatov has been appointed acting director of the affiliate of the Machine Science Institute imeni A.A. Blagonravov of the USSR Academy of Sciences in Leningrad.

An affiliate of the Machine Science Institute imeni A.A. Blagonravov of the USSR Academy of Sciences has been organized in Gorkiy. The basic directions of its scientific activity have been approved. Candidate of Technical Sciences G.K. Sorokin has been appointed acting director of the affiliate.

An affiliate of the Machine Science Institute imeni A.A. Blagonravov of the USSR Academy of Sciences with a special design bureau, a pilot works, and a testing ground has been organized in Sverdlovsk. The basic directions of its scientific activity have been approved. Doctor of Technical Science V.M. Makarov has been appointed director of the affiliate.

The Power Engineering Problems of Chemical Physics Institute of the USSR Academy of Sciences (INEP KhF AN SSSR) has been organized in Moscow on the basis of the Department of Physical Methods for Stimulating Chemical Reactions of the Chemical Physics Institute of the USSR Academy of Sciences. The scientific and scientific methods supervision of the institute has been assigned to the Physical Technical Problems of Power Engineering Department of the USSR Academy of Sciences. The basic directions of the institute's scientific activity have been approved.

Corresponding Member of the USSR Academy of Sciences V.L. Talroze has been appointed director of the Power Engineering Problems of Chemical Physics Institute of the USSR Academy of Sciences.

The Physiology Institute of the USSR Academy of Sciences has been organized in Moscow. The institute was established on the basis of a number of laboratories of the Chemical Physics Institute of the USSR Academy of Sciences and laboratories of the Higher Nervous Activity and Neurophysiology Institute of the USSR Academy of Sciences. The basic directions of its scientific activity have been approved. The scientific and scientific methods supervision of the institute has been assigned to the Physiology Department of the USSR Academy of Sciences. The duties of director and organizer have been assigned to Academician O.G. Gazenko.

The Problems of the Development of the North Institute of the Siberian Department of the USSR Academy of Sciences has been organized in Tyumen on the basis of the Geocryology Department of the Geology and Geophysics Institute of the Siberian Department of the USSR Academy of Sciences, the Economic Research Department of the Economics and Organization of Industrial Production Institute of the Siberian Department of the USSR Academy of Sciences, and the Laboratory of the Optimization of the Development and Functioning of the Western Siberian Fuel and Power Complex of the Siberian Power Engineering Institute of the USSR Academy of Sciences. The basic directions of the institute's scientific research have been approved. The scientific and scientific methods supervision of the institute have been assigned to the Oceanology, Atmospheric Physics, and Geography Department of the USSR Academy of Sciences and the Physical Technical Problems of Power Engineering Department of the USSR Academy of Sciences.

The duties of director and organized have been assigned to Doctor of Geological Mineralogical Sciences V.P. Melnikov.

Doctor of Geological Mineralogical Sciences V.A. Koroteyev has been appointed director of the Geology and Geochemistry Institute imeni Academician A.N. Zavaritskiy of the Ural Scientific Center of the USSR Academy of Sciences and has been relieved of the duties of director of the Ilmenskiy State Reserve imeni V.I. Lenin of the Ural Scientific Center of the USSR Academy of Sciences.

The Economics of the Complex Development of Natural Resources of the North Institute of the Yakutsk Affiliate of the Siberian Department of the USSR Academy of Sciences has been established in Yakutsk on the basis of the Economics Department of the Yakutsk Affiliate of the Siberian Department. The basic directions of its scientific activity, which were agreed upon by the State Committee for Science and Technology, have been approved. The scientific and scientific methods supervision of the institute have been assigned to the Economics Department of the USSR Academy of Sciences, the duties of director and organizer have been assigned to Doctor of Economic Sciences N.V. Igoshin.

The Nauka Special Design and Technological Bureau of the Siberian Department of the USSR Academy of Sciences has been established in Krasnoyarsk on the basis of the Krasnoyarsk Affiliate of the Special Design Bureau of Computer Technology of the Siberian Department. The basic directions of its scientific activity have been approved. Scientific methods supervision has been assigned to the Biophysics Institute, the Physics Institute imeni L.V. Kirenskiy, and the Computer Center (Krasnoyarsk) of the Siberian Department of the USSR Academy of Sciences. The duties of chief and organizer have been assigned to Doctor of Physical Mathematical Sciences V.F. Shabanov.

The Electrophysics Institute of the Ural Scientific Center of the USSR Academy of Sciences has been established in Sverdlovsk on the basis of the Electrophysics Department of the Physics of Metals Institute of the Ural Scientific Center of the USSR Academy of Sciences. The basic directions of the institute's scientific research have been approved. Scientific methods supervision has been assigned to the General Physics and Astronomy Department of the USSR Academy of Sciences. Academician G.A. Mesyats has been appointed director of the Electrophysics Institute of the Ural Scientific Center of the USSR Academy of Sciences.

The basic directions of the scientific research of the Polar Geophysics Institute of the Kola Affiliate imeni S.M. Kirov of the USSR Academy of Sciences have been approved. Scientific and scientific methods supervision has been assigned to the General Physics and Astronomy Department of the USSR Academy of Sciences and for questions pertaining to the study of atmospheric physics, including the upper atmosphere, to the Oceanology, Atmospheric Physics, and Geography Department of the USSR Academy of Sciences.

The Scientific Council for Fundamental Problems of Future Technologies has been organized under the Presidium of the USSR Academy of Sciences. Academician A.P. Aleksandrov has been approved as chairman of the Scientific Council of the USSR Academy of Sciences for Fundamental Problems of Future Technologies.



The Scientific Council of the USSR Academy of Sciences for Problems of Economic, Scientific, and Technical Cooperation of the USSR With Socialist Countries has been organized under the Social Sciences Section of the Presidium of the USSR Academy of Sciences for the coordination of research on questions of forecasting the economic, scientific, and technical relations of the USSR with socialist countries and ensuring the more active participation of scientific institutions of the USSR Academy of Sciences in this work. Corresponding Member of the USSR Academy of Sciences Yu.S. Shirayev has been appointed chairman of the Scientific Council of the USSR Academy of Sciences for Problems of Economic, Scientific, and Technical Cooperation of the USSR With Socialist Countries.

The Artificial Intelligence Section of the Scientific Council of the USSR Academy of Sciences for the Complex Problem "Cybernetics" has been transformed into the Scientific Council of the USSR Academy of Sciences for the Problem "Artificial Intelligence." Academician G.S. Pospelov has been approved as its chairman.

Corresponding Member of the USSR Academy of Sciences M.V. Alfimov has been appointed acting director of the Chemical Physics Institute of the USSR Academy of Sciences.

Corresponding Member of the USSR Academy of Sciences S.R. Mikulinskiy has been relieved of the duties of director of the History of the Natural Sciences and Technology Institute of the USSR Academy of Sciences at his personal request in connection with the state of his health and has been transferred to the post of senior scientific associate of the Archive of the USSR Academy of Sciences.

S.R. Mikulinskiy has been relieved of the duties of editor in chief of the journal VOPROSY ISTORII YESTESTVOZNANIYA I TEKHNIKI of the USSR Academy of Sciences at his personal request.

Gratitude was expressed to S.R. Mikulinskiy for many years of work.

Doctor of Philosophical Sciences N.I. Lapin has been appointed director of the Philosophy Institute of the USSR Academy of Sciences.

Corresponding Member of the USSR Academy of Sciences M.N. Mikheyev has been relieved of the duties of director of the Metal Physics Institute of the Ural Scientific Center of the USSR Academy of Sciences at his own request. Gratitude was expressed to M.N. Mikheyev for many years of fruitful work in the position of director of this institute.

Doctor of Technical Sciences V.Ye. Shcherbin has been appointed director of the Metal Physics Institute of the Ural Scientific Center of the USSR Academy of Sciences.

Corresponding Member of the USSR Academy of Sciences M.A. Sergeyev has been relieved of the duties of director of the Economics Institute and deputy chairman of the Presidium of the Ural Scientific Center of the USSR Academy of

Sciences at his own request and has been left a member of the Presidium of the Ural Scientific Center.

Gratitude has been expressed to M.A. Sergeyev for many years of fruitful work in the position of director of the institute.

Corresponding member of the USSR Academy of Sciences V.P. Chichkanov has been relieved of the duties of director of the Economics Research Institute of the Far Eastern Scientific Center of the USSR Academy of Sciences and appointed director of the Economics Institute of the Ural Scientific Center of the USSR Academy of Sciences.

Corresponding Member of the USSR Academy of Sciences L.N. Andreyev has been approved as chairman of the Scientific Council of the USSR Academy of Sciences for the Problem "The Introduction and Acclimatization of Plants."

Corresponding Member of the USSR Academy of Sciences V.A. Zharikov has been approved as chairman of the Soviet Committee for the International Program of Geological Correlation.

Academician of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin V.A. Tikhonov has been relieved of the duties of chairman of the Scientific Council of the USSR Academy of Sciences for Socioeconomic and Legal Problems of the Agroindustrial Complex of the USSR in connection with his transfer to another job.

Academician I.I. Lukinov has been approved as chairman of the Scientific Council of the USSR Academy of Sciences for Socioeconomic and Legal Problems of the Agroindustrial Complex of the USSR.

Doctor of Historical Sciences G.D. Komkov has been relieved of the duties of director of the Science Publishing House in connection with his retirement. Gratitude was expressed to G.D. Komkov for many years of productive work at the USSR Academy of Sciences.

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INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 29-34

[Article under the rubric "In the Presidium of the USSR Academy of Sciences": "On the Participation of USSR in the Work of International Institute for Applied Systems Analysis"]

[Text] The International Institute for Applied Systems Analysis (IIASA) is a unique scientific institution that unites scientists of a number of countries of the East and West for the studying complex long-range problems, which are of a global nature and require for their solution an interdisciplinary approach. The participation of our country's scientific institutions, above all the USSR Academy of Sciences, in the institute's work was discussed at one of the meetings of the Presidium of the USSR Academy of Sciences.

Opening the meeting, President of the USSR Academy of Sciences Academician A.P. Aleksandrov noted the importance of the IIASA's operations, its role in effecting international information exchange and international cooperation, which is especially important under present conditions when due to complicated international circumstances contacts among scholars from different countries have been reduced. The institute's activity in this direction is extremely useful and should be expanded.

At the same time, A.P. Aleksandrov directed attention to possible difficulties in the IIASA's work. The point is that the institute is legally the joint property of the member countries and exists on their contributions, primarily on the contributions of the USSR and United States. However, in the United States difficulties have arisen with using federal resources to finance the IIASA. In connected with the financial difficulties, the institute's administration is expressing the intention to shift to work on contracts and thereby to attain self-financing. In A.P. Aleksandrov's opinion, this would be extremely undesirable: the institute should deal with important problems of power engineering, food supply, the fight against shortages of mineral raw materials, and the world economy, which are important for all mankind. If the institute shifts to comparatively special problems, with which it is only possible to deal only through contracts, the benefit from its activity will decrease drastically.

Academician D.M. Gvishiani, chairman of the Committee for Systems Analysis of the USSR Academy of Sciences, which coordinates the cooperation of Soviet scientific institutions in the IIASA, and chairman of a council of the IIASA, gave an account of the work of Soviet scientists and scientific organizations in the IIASA.

The academies of sciences or other analogous scientific organizations of 16 countries, D.M. Gvishiani recalled, are taking part in the work of the IIASA. Currently approximately 200 people, including 95 scientific associates, work in the institute, which is located in a suburb of Vienna. In addition, about 1,500 scholars from different countries annually participate in its measures on a short-term basis to some degree or other. It cooperates on a continuous basis with 400 scientific organizations throughout the world, many industrial firms, and international organizations in the UN system: UNESCO, UNIDO, and others, which partially finance some of its projects.

The institute has existed for 14 years--not too long a period for the establishment of even an ordinary scientific institution, not to mention an international and interdisciplinary institute where scientists from socialist and capitalist countries work side by side. Nevertheless, it has had time to establish itself as a productively operating scientific institution, complete a number of jobs of great methodological and applied significance, hold more than 300 conferences and seminars, and publish more than 50 monographs and over 2,000 other works. Experience, which makes it possible to summarize specified results and formulate the principles of the participation of the USSR Academy of Sciences in the work of the IIASA, has been gained.

In the charter of the institute it is noted that it was established for the analysis of tasks of increased difficulty and complexity, the study large-scale problems, including of a global nature, which require an interdisciplinary approach, the unification of the methods of the exact sciences and humanities, and the use of computer hardware.

When the USSR Academy of Sciences was making a decision on participating in the work of the institute, it set as its goal to use the possibilities of long-term joint work of scientists within the structure of international collectives for the exchange of advanced scientific and technical know-how and the most advanced methods of solving large-scale basic and applied problems and the organization of research work and on this basis to create the conditions for the making of long-term forecasts. Several directions of research have formed at the institute. These are the theory and applied methods of systems research, questions of the interrelation of technology, economics, and society, power systems, problems of the environment, water resources, problems of demography and health, food and agriculture, and the management of information and computer systems.

While devoting much attention to coordinating the work of different institutions, the institute has focused attention on the most important problems, first of all the development of world power engineering. Having conducted research and made a forecast for the year 2000, specialists of the institute have turned to making a forecast for 2030 and from this standpoint can refine the previous estimates. A long-term forecast for the development

of power engineering is also being developed. A summary work entitled "Energy in a World With Limited Resources. Global Development of Power Engineering," which gained wide recognition by specialists throughout the world, was published several years ago. Essentially all the possible versions of the development of events in the sphere of power engineering were analyzed in this work on the basis of the systems approach. Much attention was devoted to evaluating the role of synthetic liquid fuels made of coal in the long-term future: the stabilization and even reduction of oil prices make earlier appraisals problematic.

The role of the IIASA in analyzing the problems of food supply and the development of agriculture has increased significantly. In the opinion of experts, the institute has the most advanced technology today for simulating the food situation.

The institutions of the USSR Academy of Sciences could play a large role in selecting research themes in planning the institute's work. The academy's departments and sections can take part in discussing plans, projects, and proposals and determining priorities when selecting specific themes and send their own proposals that deal with the institute's activity. It is advisable to formulate a long-term program of participation of the USSR Academy of Sciences in the work of the IIASA. In its activity the institute should try to obtain basic results of a long-term nature, although work on contracts is attractive for the possibility of a quick impact.

In conclusion, D.M. Gvishiani emphasized that the role of the International Institute for Applied Systems Analysis as a channel for international scientific contacts has increased sharply in recent times. These possibilities of it should be used as effectively as possible in the interests of the development of science and the improvement of the international climate and for the strengthening of the atmosphere of cooperation.

V.S. Kaftanov, deputy director of the IIASA, noted that the effectiveness of the institute's work and its high productivity with a relatively modest size are in many respects determined by its close cooperation with a multitude of national and international scientific organizations. Here the institute is trying to select for its work those problems, which worry both the East and the West, require cooperation of the representatives of different scientific disciplines, and presuppose long-term forecasting. Work is currently being performed on a wide range of problems, including methodological ones: new research and forecasting methods, which have been brought up to the level of algorithms, are being developed. The necessity and possibility of forming strong multinational collectives, the interest of different countries in a given theme, and the availability of sources of financing are also being considered. The proposals of the Academy of Sciences can be of great help in the selection of themes and in the long-range planning of the institute's work.

The contact of the scientific institutions of the academy with the institute may also be extremely useful for both sides at the stage of conducting research. Each associate who comes to the IIASA to work represents an entire scientific organization with a large creative potential. And the stimulation

of contacts of these organizations with the institute, the coordination projects being conducted, and the exchange of information may, as experience has shown, sharply increase the efficiency of work.

Today such contacts between the institute and Soviet scientific organizations are being maintained during work on the problems of power engineering and agriculture. They must be expanded in the area of studying the environment, having strengthened the contacts of the IIASA with the institutions of the USSR Academy of Sciences and the State Committee for Hydrometeorology and Environment Control and by organizing joint programs, up to unified plans and schedules.

Then V.S. Kaftanov responded to questions of the meeting participants on the prospects for studying individual problems: the stability of the biosphere, acid rain, and ways of extending the human life span. He recalled that the file of research proposals submitted to the institute is about tenfold greater than its possibilities and that it is necessary not only to select projects strictly, but also to establish a specified sequence. Thus, the development of medicinal means for extending the human life span has been postponed to a later date. The point is that the renowned demographer from the United States, Professor Keyfitz, has been invited to be the director of the project on population. To use his knowledge and experience with the greatest effect, the institute is not burdening him with problems that are far from his specialty. It is proposed to return later to the problems of gerontology. Up until now these problems have not been dealt with in other international organizations, but, in all probability, soon will be, and for the IIASA this is a tempting opportunity to be "at the crest" of a topical direction.

More and more interest is being displayed today in works on the stability of the biosphere. Many independent organization, which are willing in part to assume their financing, are interested in them. Such research will probably be started soon.

As far as the problems of acid rain are concerned, the IIASA is one of a few organizations which are studying them comprehensively. A mathematical model, which makes it possible to plot zones of differing degrees of pollution on a map of Europe subject to the versions of specific policy in the areas of power engineering, transport, and so forth, has been developed.

During the discussion of the reports Academician M.A. Styrikovich described the IIASA's work in the area of power engineering. He mentioned that in the early 1970's, when the institute was created, notions about the exponential growth in power consumption and other economic characteristics, moreover, with a short period of doubling, dominated everywhere. These notions were reinforced and promoted by the works of the Club of Rome, and the energy crisis of 1973-1974 increased concerns over the prospects of an uncontrolled growth in energy consumption even more.

It is no surprise that from the very beginning the institute devoted enormous attention to forecasting the development of power engineering. The project immediately assumed an integrated character, since it is impossible to forecast the development of power engineering without taking the dynamics of

demographic and economic factors, reserves of natural resources, and possible climate changes into account. These works culminated in the publication of a summary monograph entitled "Power Engineering in a World With Limited Resources" and significantly influenced not only the forecasting of the development of power engineering, but also our ideas about the prospects of development of civilization as a whole. It became clear that an exponential growth in power consumption is not to be expected, that the growth will gradually slow down. These conclusions have been confirmed increasingly through the years.

Soviet scientists took a most active part not only in specific planning analyses, but also in the formation and substantiation the principal approach that was the basis for the project.

On the suggestion of Soviet scientists the IIASA's energy project has now been concentrated on, it would seem, a more specific problem--the role of natural gas in power engineering of the future. This issue is especially important for clarifying the prospects of power engineering. That the role of oil--the universal and cheapest fuel--while growing continuously from 1950 to 1975, should be reduced in the future was clear to everyone a long time ago. Measures for saving it, which became justified given rather high prices, development of nuclear power, and utilization of huge coal reserves should have facilitated this, but many proposals were not confirmed. The development of nuclear power slowed down in a number of countries because its growth rates were lower than expected; utilization of coal is also meeting with growing resistance, since it leads to many negative ecological consequences including acid rain, which was already mentioned during the discussion and leads to the acidification of soil and surface waters. Under these conditions many specialists are connecting the prospects of development of power engineering in the next few decades more and more with natural gas--the ecologically "cleanest" and comparatively accessible fuel.

M.A. Styrikovich further touched upon the issues of organizing the work of Soviet specialists at the IIASA. Under the conditions of financial constraints have it was difficult to invite a large number of specialists for an extended time span. On the other hand, work on the energy project showed that taking a specialist from his organization for 1-2 years or more is often also not feasible from the perspective of institute sending him: in such a period of time the specialist to some degree loses touch with the work being conducted at the institute. Another form of organization proved to be more preferable: Soviet specialists working on problems corresponding to the theme of a project periodically, in accordance with a coordinated schedule, come to the institute for 1-2 months. At the same time the institute also invites specialists from the West, who are working on the same sections of the project. The scientists compare and discuss the results obtained and exchange information, and the work at each of the institutions receives a new impetus. This method seemed to be the most economical and effective, and it is perhaps be advisable to carry it over to other projects as well.

The institute should also think about a closer mutual coordination of the projects being conducted at it. Thus, it is obvious that the project on the study of acid rain is most closely connected, on the one hand, with projects

dealing with the utilization of coal--the basic source of emissions of sulfur and nitrogen oxides into the atmosphere--and, on the other hand, with works on natural gas that makes it possible to minimize such emissions.

Academician A.A. Nikonov spoke about the cooperation of Soviet scientific institutions with the IIASA in studying agricultural problems. Soviet scientists used IIASA's methodology to create a model of the development of agricultural production in the USSR. This model may now be adapted to conditions of different countries and regions. Soviet scientists have gained much experience, which is enabling them to make no small contribution to the simulation of the development of world agriculture. A.A. Nikonov stressed the necessity of continuing work on agriculture at the IIASA, because the severity of food problems in the world is not decreasing.

A.L. Yanshin, vice president of the USSR Academy of Sciences, reported on the work on analyzing the prospects of development of world trade in mineral resources. A large project devoted to such an analysis was recently completed. The All-Union Scientific Research Institute of Systems Research posed the question of the need to continue this work and to make a more detailed forecast of the use of individual types of resources. The preplanning development of the theme "Structural Shifts in the Metallurgical Industry and the Mineral Raw Material Base. Ferrous Metallurgy and Phosphates" was begun under the influence of these proposals. This work is very urgent, since new deposits of these resources have been discovered in the recent years, which is causing a certain redistribution of production and trade. Thus, after the discovery of large phosphate deposits in Iraq, Morocco--the main phosphate exporter in the world market until recently--has been faced with the problems of overproduction and overstocking. Great changes are also occurring in the economics of the use of ores in connection with the development of processing technology.

These problems require the closest study, especially as staffs of specialists, who are capable of working on these problems on both a long-term and a short-term basis, have been trained.

Academician G.A. Arbatov noted that at the institute it is also necessary to study political problems: the analysis of international conflicts, crises, and so forth. Scientists of various countries are showing great interest in these problems. It would be interesting to study the problems connected with a "nuclear winter" in greater detail.

Today problems of Europe-wide cooperation are being brought to the forefront. In talks both scientists and leaders of the Western European countries have often proposed that we jointly study some questions or others of economic cooperation.

Questions of this sort, which are of interest for our country and the countries of Western Europe, could occupy a place in the institute's themes, especially under present conditions, when the participation of the United States in its work is decreasing. Business circles of a number of countries of the West are interested in studying them.



Corresponding Member of the USSR Academy of Sciences G.V. Voropayev noted that the Scientific Council for the Use Systems Analysis in Solving Water Problems, which acts in the framework of the Committee for Systems Analysis of the USSR Academy of Sciences, has succeeded in organizing coordinating work within the country and establishing good contacts with the IIASA. Such serious and interesting tasks as the development of models for forecasting water consumption, which help reduce discharges and prevent pollution, or the forecasting of the growth in water consumption, were accomplished by joint efforts. The tasks of calculating the redistribution of water resources when creating complex water management systems (for example, the Tennessee program for the United States) and other regional tasks of rationalizing water consumption were also accomplished. Many intrareservoir processes, particularly the development of eutrophicated water reservoirs, were studied. The work on forecasting the ecological, hydrochemical, and hydrobiological situation on Lake Balaton was especially interesting.

Water problems are of an interdisciplinary nature, they involve resources that are limited for any country, and optimizing the use of these resources is of general interest. By using water resources, we are affecting the biosphere in a most serious way, so that forecasts of the behavior of the water environment in the distant future are of great interest in planning any long-term programs. At one time the USSR proposed to formulate the international program "Water Resources of the Future." It would have been most closely connected with the program of forecasting climate changes and would have been of interest to specialists in the most diverse branches of knowledge and many international organizations. The solution of the problems outlined in it would have been most closely connected with all economic activity. Unfortunately, this program was not included in the plans of the IIASA, where work on studying water resources is being cut back. It is necessary to expand the study of these problems at the institute, relying on the national programs being implemented in different countries.

The great amount of work, which is being done by the Committee for Systems Analysis of the USSR Academy of Sciences and is ensuring the participation of Soviet scientists in the International Institute for Applied Systems Analysis, the importance of participation of the scientific institutions of the USSR Academy of Sciences in the institute's work, and expansion of the number of institutes of the academy, which are actively collaborating with the IIASA, are noted in the decree adopted by the Presidium of the USSR Academy of Sciences.

At the same time the participation of institutes of the academy in scientific research of the IIASA is still insufficient. Not all the departments of the academy are being involved in cooperation, and the problems of selecting qualified personnel for work at the IIASA have still not been completely solved. There are shortcomings in organizing the use of the institute's scientific results and informing the scientific institutions of the USSR Academy of Sciences about its research.

The Presidium of the USSR Academy of Sciences resolved to endorse the activity of the Committee for Systems Analysis on supporting USSR participation in the IIASA. The committee has been charged to elaborate measures on increasing the

effectiveness of using the institute's scientific results and on the more extensive familiarization of Soviet scientific institutions with its research and to prepare proposals on translating into Russian the institute's best works in the field of systems analysis and its applications, as well as the information quarterly of the institute.

The Committee for Systems Analysis and the Foreign Relations Administration of the USSR Academy of Sciences have been ordered to perform work on the strengthening of the ties with the IIASA of those Soviet scientists, who are actively collaborating with other international organizations, to generalize the proposals of the sections of the Presidium and departments of the USSR Academy of Sciences on participation of the USSR Academy of Sciences in the IIASA, and to prepare proposals on the further improvement of the organization of such participation.

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## CONFERENCES AND EXPOSITIONS

### SPEECHES OF PARTICIPANTS OF GENERAL ASSEMBLY SESSION

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 35-79

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[Text] Corresponding Member of the USSR Academy of Sciences A.S. Khokhlov, deputy chief scientific secretary of the Presidium of the USSR Academy of Sciences

At a session of the General Assembly in December 1985 Academician V.L. Ginzburg introduced a proposal that the Presidium of the USSR Academy of Sciences would periodically inform the General Assembly about the implementation of the proposals set forth at previous sessions.

It is necessary to note that some of these proposals, which were made at the General Assembly in March 1986, have already been covered in V.A. Kotelnikov's report and will therefore not be repeated here. In particular, the report contained a response to the proposals on the strengthening of the material base of the USSR Academy of Sciences, the training of personnel through graduate studies, the activity of interbranch scientific technical complexes, the intensification of the work of problem scientific councils, and several other topics. This speech is devoted to responding to the remaining proposals.

Academician A.I. Anchishkin proposed to reexamine the concept of science as a special sphere of activity, which should help "fuse" basic and technological research. This principal issue of science policy concerns the basic tasks and objectives of the activity of the USSR Academy of Sciences as a leading center of basic research, through the development of which the academy also has a most profound effect on the acceleration of scientific and technical progress in the country.

The basic research being conducted at the USSR Academy of Sciences should be more closely linked with the tasks of developing fundamentally new equipment and technology. In this direction the technical orientation of the work of

academic institutions can be strengthened--in accordance with the decisions of the 27th CPSU Congress. In accordance with the decision of the previous General Assembly, academic scientific institutions have modified the five-year and annual plans with allowance made for the tasks posed by the congress.

Some work in this direction was done after the April (1985) CPSU Central Committee Plenum and the conference of the CPSU Central Committee in June of the same year on questions of the acceleration of scientific and technical progress. Thus, the Scientific Council for Fundamental Problems of Promising Technologies, which is headed by the president of the academy, was organized in December 1985 under the Presidium for the purpose of bringing basic and technological research closer together. The council's basic tasks are the identification of fundamentally new technologies, the setting for departments of the USSR Academy of Sciences of tasks in connection with their development and introduction in practice, and the analysis and evaluation of proposals on new technological processes.

The organization of interbranch scientific technical complexes, in which academic scientific institutions are taking an active part, also pursues the same objective. As was already mentioned, V.A. Kotelnikov spoke of this in his report. In a number of cases the prompt change of the formed structure of institutes and the establishment of temporary collectives are conducive to the concentration of the efforts of academic institutes on the most important directions and on operations which afford opportunities for the accomplishment of urgent applied tasks.

To elaborate urgent specific problems the USSR State Committee for Science and Technology on the suggestion of the USSR Academy of Sciences resolved to set up 40 temporary scientific and technical laboratories in the academy system. At present 31 such laboratories have been set up, including 1 at the Siberian Department of the USSR Academy of Sciences and 4 at institutes of the republic academies; 9 more laboratories are still at the stage of formation.

In the speech of Academician N.D. Kuznetsov it was proposed to establish an academic scientific center in Kuybyshev Oblast, where machine building has undergone a great deal of development. As is well known, an affiliate of the Physics Institute imeni P.N. Lebedev has been operating in Kuybyshev for several years now. The Institute of the Ecology of the Volga Basin has been established in Togliatti of Kuybyshev Oblast. The Presidium of the USSR Academy of Sciences and the State Committee for Science and Technology recently submitted a proposal to the USSR Council of Ministers on the establishment of an affiliate of the Institute of Machine Science (with an experimental design bureau [OKB] and pilot plant) in Kuybyshev. Thus, the academic base in Kuybyshev Oblast is growing, and it can be hoped that the "critical mass" that will make it possible to speak of the establishment of a scientific center will have been accumulated in the near future.

Questions of ecology and the efficient use of natural resources arise at practically every General Assembly. These questions were also touched upon in a number of speeches at the preceding session.

Academician A.F. Treshnikov and Corresponding Member of the USSR Academy of Sciences Yu.A. Izrael emphasized the need to expedite the adoption of the Ecology Program. At present the work on preparing the program is apparently nearing completion. The collection of proposals of the scientific centers and affiliates of the USSR Academy of Sciences, academies of sciences of the union republics, ministries, and departments on participation in this program is being completed. The Presidium of the USSR Academy of Sciences has proposed discussing its draft at the end of this year.

Academician N.N. Moiseyev spoke of the need to submit a proposal to the directive organs on making a serious scientific, as well as ecological appraisal of the most important scientific and technical measures and national economic projects under the supervision of the USSR Academy of Sciences. Some work has been done here. Scientists of the academy are already now being enlisted in the making of an ecological appraisal of the construction of large production complexes. The draft of the Decree on the Procedure of the Making of an Ecological Appraisal of New Equipment, Technology, and Materials, as Well as the Designing, Construction, and Operation of National Economic Facilities has been prepared.

Everyone knows that the valid criticism of the plan to divert the northern rivers, which many scientists of the Academy of Sciences also actively voiced, resulted in the cessation of this expensive and unprofitable work.

Academician A.L. Yanshin touched upon the problem of using the potassium salts and petroleum of the Verkhnyaya Lena Territorial Complex. The Earth Sciences Section is now preparing a discussion of the problem of the quickest development of the Verkhnyaya Lena Territorial Complex at the meeting of the Presidium of the USSR Academy of Sciences.

Academicians N.M. Zhavoronkov and T.S. Khachaturov raised the question of the complex processing of nephelinic concentrates into alumina, soda, potash, and cement, which can in no way be organized on account of interdepartmental barriers. In the same speech Academician T.S. Khachaturov proposed to set up interdepartmental scientific organizations to examine questions of the efficient and economical consumption of national economic resources. It must be said that such questions are now being examined during the formulation of the Comprehensive Program of Scientific and Technical Progress.

In addition, T.S. Khachaturov noted the feasibility of a measure such as forbidding enterprises and institutions from accumulating above-standard stocks, at the same time as ensuring the uninterrupted supply of enterprises with materials, and reducing the intrashift idle times of workers to a minimum. On these questions the Economics Institute of the USSR Academy of Sciences prepared analytical notes and a scientific report, which were sent to the USSR State Planning Committee.

In the speeches of Academicians A.I. Anchishkin and M.A. Styrikovich the problems of price setting (prices for new equipment and natural resources), which both economists and representatives of the technical sciences should solve, were touched upon. The Economics Department of the USSR Academy of Sciences conducted expanded meetings of the bureau, at which procedural and

practical questions of price setting under the new management conditions, were discussed, with allowance made for the tasks of stimulating scientific and technical progress, above all stimulating production of new highly efficient equipment. Representatives of the USSR State Planning Committee, the State Committee for Science and Technology, and the State Committee for Prices took part in the discussions. Means of improving the price-setting mechanism, which stimulates not simply more efficient equipment, but also production of equipment of new generations and systems of machines and mechanisms with a unified technology, were outlined. Here attention was directed to the fact that in price setting both the manufacturer's and the consumer's interests should be taken into account. A great deal of attention was devoted to the questions of revising the system of prices, including prices for natural resources used in industrial and agricultural production. In connection with the fact that no unified opinion was reached on a number of questions of price setting, the USSR Academy of Sciences sent its proposals to the directive instances.

This is not the first time that questions of increasing the effectiveness of the work of scientific councils are being raised at sessions of the General Assembly. V.A. Kotelnikov also mentioned this, but it must be admitted that the Presidium has yet to find the necessary forms of reorganization of the system of the scientific councils. Here it is necessary to implement a number of measures, which involve not only the increase of the responsibility of scientific councils, but, evidently, also the increase of their rights. However, for the present there are not specific proposals in this area.

In conclusion the letter of Corresponding Member of the USSR Academy of Sciences V.L. Talroze, which was addressed to the previous General Assembly, should be mentioned. Television broadcasts containing explicitly antiscientific information were criticized in the letter. It must be said that the Academy of Sciences has more than once addressed the question of data covered in the press and on television, which have been insufficiently verified in the scientific respect.

The Coordinating Council for Information on Achievements of Science attached to the Presidium of the USSR Academy of Sciences has now taken a number of additional steps on work with the mass media. A series of meetings of scientists with scientific journalists, especially on problems of physics, which are misreported particularly often, were held. Serious speeches of scientists at the Central Writers' House were given, a round table was organized in LITERATURNAYA GAZETA. The Coordinating Council proposed that a group of science commentators be formed under Central Television. The new management of the State Committee for Television and Radio Broadcasting is now collecting their nominations. There is a proposal of the Coordinating Council on the establishment of a State Prize for the best work in the field of the promotion of USSR scientific and technical achievements.

Of course, the instances when the editorial boards do not consult with scientists and publish erroneous materials have caused regret. But even more disagreeable is the fact that there are many associates of academic institutions and even members of the Academy of Sciences, are not sufficiently demanding of themselves and speak on topics in which they are incompetent.

The second disagreeable thing is that there are still individual cases when books containing direct scientific errors are published at the Science Publishing House. They are published because they have positive reviews by the members of the USSR Academy of Sciences, who, unfortunately, allow themselves to review books outside their specialty, being guided by friendly considerations.

Therefore, before expressing dissatisfaction with journalists, scientists need to treat in a most exacting and demanding manner their own statements and be completely intolerant of all forms of nonscientific propaganda. Unfortunately, this is not always done.

Academician Zh.I. Alferov

It is extremely gratifying that in the speech of Politburo Member and Secretary of the CPSU Central Committee Ye.K. Ligachev and the first speech of new President G.I. Marchuk mentioned the necessity of raising the level and value of the basic research being conducted at the Academy of Sciences is discussed. It is necessary to say that if this is possible, above all in the basic priority directions of the natural and social sciences, then it will also be possible to attain the real introduction of academic developments. The academy is devoting much attention to questions of introduction, but the situation is not as good as one would like.

The introduction not of specific new instruments, but of new ideologies and new advanced directions should become one of the main directions in the problem of introduction. It is possible to cite many examples when very important discoveries were made in the Soviet Union, but their implementation was successfully carried out in the West. And the reason here lies not only in the passivity of some organizations, ministries, and departments, but also in the fact that the problem of introducing a new scientific and technical ideology has not yet been properly posed.

And, obviously, the main task of our academic institutions consists in this: to launch at the proper time in priority directions the elaboration of scientific problems, to learn to evaluate this work, and to support new directions in a timely and proper manner.

I would like to express my opinion on several specific problems that were touched upon in V.A. Kotelnikov's report, particularly the problem of the aging of the scientists, which worries everyone. Now at the academy, it seems, only Academician S.P. Novikov is under 50. It is necessary to know how to make out talented young people in time and to properly support them.

In the report it was stated that in the West many 30-year-old specialists leave science for industry. But, as a rule, the training of personnel of the highest scientific skill with the academic degree of doctor of philosophy, which corresponds to our candidate degree, is done only in universities. If in our country the primary training of personnel in the priority directions of science and technology was concentrated in academic institutes and universities primarily for industry, then those persons who completed such

training would leave for industry and young persons would take their place. The task of rejuvenating scientific personnel at academic institutes and the task of strengthening scientific contact with industry and sectorial institutes would thereby be accomplished, because the strongest, closest connection of science with production is the training of highly skilled scientists for industry, with which feedback, which facilitates the introduction of advanced scientific and technical ideology, emerges.

Academician B.N. Ponomarev

The present session of the General Assembly of the USSR Academy of Sciences is taking place during a very crucial period of the development of our society. The 27th CPSU Congress launched a new stage of the building of communism. In the Policy Report of the CPSU Central Committee to the 27th party congress the tasks of accelerating the country's socioeconomic development and eliminating the accumulated shortcomings and errors were boldly formulated and the necessity of reorganizing the work of all organizations and developing new thinking to successfully accomplish the tasks in domestic and international affairs was indicated.

In the age of the scientific and technical revolution, the role of the natural sciences and of the practical utilization of their results is growing to an enormous degree. This was spoken about in detail in the report of Vice President of the USSR Academy of Sciences Academician V.A. Kotelnikov. I would like to dwell on the problems facing the social sciences.

In our critical times, when the improvement of socialist society is developing on the basis of the decisions of the 27th CPSU Congress and when the roads to the future are being laid, the opening of these roads in all directions is required. Today a creative, innovative approach to accomplishing the arising tasks in the area of both the base of society and its superstructure is required. New problems are arising for social scientists and the theory of scientific socialism as the Soviet Union advances along the road of the building of communism. K. Marx and F. Engels specified the basic directions of the building of a socialist society. V.I. Lenin developed a brilliant comprehensive plan of the building of this society. But the farther ahead we go, newer and newer problems and tasks, which, of course, the founders of Marxism-Leninism could not have foreseen, arise more and more.

The increase of the scale, the complexity of the tasks of improving socialism, the necessity of developing and consistently implementing a policy, which ensures their successful accomplishment and the fundamental interconnection of the economic, social, and spiritual progress of society, the need for the further creative development of Marxist-Leninist theory, as well as the complication of foreign policy conditions in connection with the increasing aggressiveness of imperialism, and the task of saving mankind from the threat of a nuclear destruction are posing truly enormous tasks for the social sciences. V.I. Lenin's idea about the extremely important role of theory, which was advanced at the dawn of our party's establishment, retains all its importance in our times. The theory and science of the development of socialism are called upon to light up the path ahead in all the specified directions, to develop methods for accelerating the country's socioeconomic



development, and to give answers to the questions which arise in the domestic and foreign policy of Soviet society.

The party Central Committee is attaching enormous importance to the socioeconomic sciences. This was expressed with full force at the All-Union Conference of Heads of Social Sciences Chairs. In M.S. Gorbachev's speech and Ye.K. Ligachev's report at this conference and in Ye.K. Ligachev's speech at this session of the General Assembly of the USSR Academy of Sciences the serious shortcomings not only in teaching, but also in the very state of the social sciences were revealed and a program of their reorganization and further development in accordance with our society's needs was advanced. Three main ideas permeated the aforementioned speeches and all the work of the held conference. The further advance of our society should be accomplished on the basis of experience-proved Marxist-Leninist science; the creative development of this science in conformity with the requirements of life and the rejection of obsolete concepts and the dogmatic approach are necessary; the assurance of the close and constant connection of theory with practice and with real life and the combating of distortions of Marxist-Leninist theory are required.

The CPSU Central Committee decree "On the Journal KOMMUNIST" contains important instructions on this matter, which we all need to master and implement. They fully apply to the sphere of the social sciences in the system of the USSR Academy of Sciences. It is advisable to examine the posed problems and tasks in this area at a special meeting of workers of humanities institutes. It is necessary to exert every effort to carry out the social order to the entire system of social sciences, which has been set forth in the speeches of Comrade M.S. Gorbachev. It is important to stress the thesis that "theory should lead practice, take phenomena more broadly, look more deeply, and see 'what time has hidden'," which is contained in the speech of M.S. Gorbachev at the All-Union Conference of Heads of Social Sciences Chairs.

As V.I. Lenin taught, it is important to treat the past "from the point of view of what will be needed tomorrow or the day after tomorrow for our policy." The center of gravity must be shifted not so much to a description of what we have experienced as to the instructions of experience, which we are receiving and should receive for our direct practical activity. In party documents, especially the Policy Report of the CPSU Central Committee to the 27th congress, it is repeatedly noted that our party is learning lessons from the past so that decisions for the future would be precise and responsible, while specific actions would be purposeful and effective.

The history of the CPSU and the history of our motherland occupy an important place among the social sciences. The use of the party's very rich experience to accomplish the tasks of accelerating the USSR's socioeconomic development and educating the Soviet person is inseparable from turning to the glorious pages of CPSU history. A knowledge of the past provides us with experience, protects us against mistakes, and helps us build the present and future better. Being educated by history is an important and integral part of ideological educational work, the spread of the world outlook of scientific socialism, and the formation of conscious workers of socialist society. Work to prepare the final 12th volume in the history of the USSR, a multiple-volume

history of the CPSU, and other historical works is currently under way. In this work it is necessary to take fully into account the decisions and instructions of the 27th CPSU Congress, the All-Union Conference of Heads of Social Sciences Chairs, and the decree of the CPSU Central Committee "On the Journal KOMMUNIST."

Our country is at the threshold of an important date--the 70th anniversary of the October Revolution and the Soviet state. Our party and all the Soviet people will properly celebrate this glorious anniversary. The Academy of Sciences is also called upon to make a considerable contribution to this.

The illustration of the historic gains in creation of the first socialist state in human history and in the matter of freeing nations from political oppression, exploitation, ignorance, poverty, and national discord are of enormous significance for us. The problem of more fully illustrating the advantages of socialism and the supremacy of the socialist system over the capitalist system, of revealing the great experience of victories, and of surmounting of difficulties and errors is not becoming obsolete. Bringing information about the history of our motherland and the Communist Party to the popular masses of foreign countries is called upon to play a large role.

It well known that the arms race is being accompanied on the part of the United States and NATO by immense propaganda activity. Its goal is to convince people that the American administration is filled with concern about preserving peace and eliminating nuclear weapons and that the Soviet Union bears all the responsibility for launching the arms race.

The Soviet position and the antiwar program, which Secretary General of the CPSU Central Committee M.S. Gorbachev set forth at the 27th party congress and in other speeches of his, including at Reykjavik, are being impudently distorted during the course of this propaganda. Representatives of American imperialism are pursuing the goal of depicting aggressive actions and the arms race as defensive and allegedly necessary for the United States and all "free mankind."

An obvious example of such distortion is the American propaganda in connection with the held Soviet-American summit in Iceland. Considering the enormous attractive force and polarity of Soviet disarmament proposals throughout the world, the U.S. President ascribed them to himself and again tried to depict himself as a proponent of peace. The entire propaganda machine was put into motion for the purpose of concealing his own aggressive militaristic position and to deceive large strata of the population. It was openly calculated that simple people in the West, without knowing the essence of the Soviet proposals, would take the word of those who had launched this propaganda campaign.

A great deal of work on spreading the truth about the Soviet Union and Soviet foreign policy lies ahead. And no small role here belongs to Soviet scientists. A lot is already being done in this respect, but life requires our efforts to be intensified significantly. In his speech at the press conference at the end of the Reykjavik meeting M.S. Gorbachev stressed that "the time of active efforts of all forces has now drawn near." M.S.

Gorbachev's speeches at the Reykjavik press conference and in Moscow on Soviet television on the results of the Iceland summit are outstanding documents of the Soviet peace strategy that contain a program of actions for the future to protect the world. Approving of M.S. Gorbachev's activity at the Reykjavik meeting, the Politburo of the CPSU Central Committee also considers it necessary henceforth to increase efforts for the purpose of radical reductions and the complete elimination of nuclear weapons.

Since the first days of Soviet power reactionary forces of the capitalist world have been conducting a fierce anti-Soviet campaign. At present it has reached unprecedented scales, and all modern scientific and technical means are being used for these purposes. Anti-Soviet propaganda directed toward capitalist countries is trying to prevent the spread of true information about the achievements of real socialism and thereby weaken and undermine the struggle of the popular masses for its own interests and in support of peace-loving Soviet foreign policy. A specific regularity may be established: the weaker capitalism's position becomes and the deeper and broader the general crisis of capitalism is, the greater and more extensive anti-Soviet, antisocialist propaganda becomes.

But in the nonsocialist zone we also have friends, including outstanding figures of culture and art. In the time that the Soviet state has existed many books and other works of art, which recreate vivid and true images of Soviet reality and show the advantages of the socialist system, have appeared abroad. The truth about our motherland, about the first socialist state in the world, is being told to the people throughout the world from the mouths of famous Frenchmen, Englishmen, Americans, Germans, Danes, and Indians. It is advisable to pick all the best from these works and publish it. The demonstration of our country's peace-loving foreign policy, the essence of which is that the USSR is speaking out for the security of all people, is especially important under present conditions.

In conclusion it is necessary to emphasize that the success in the development of our economy and science is the best basis for success on the international arena. Never has science been so closely linked with questions of war and peace as at present. Therefore, its contribution to the cause of defending peace is very great, and it has to be increased in every way possible.

Academician K.Ya. Kondratyev

I would like, albeit briefly, to discuss three questions. The first has to do with the "human factor," which is popular in our day, the second concerns further intensification of the process of democratization at the Academy of Sciences, and the third relates to certain priority directions of basic science.

We sometimes forget one of the main hard-to-solve problems, which is impeding the development of science. In those years when the Academy of Sciences and science in general were developing very rapidly, many weak or simply casual individuals wound up in science. Meanwhile effective methods, which are called upon to improve the complement of scientists, did not exist then and do not exist now. I propose to implement an annual regular 10-percent staff

reduction at all institutes and, having analyzed the institutes' work, to judge from its efficiency whether to return this resource to the institute or not. Perhaps it is also worth thinking about whether to introduce at academic institutes two categories of staff--permanent and varying, contractual.

I will proceed to the question of the further development of the process of the democratization of the Academy of Sciences. The academy is a very democratic organization, and today's meeting of the General Assembly is confirmation of this. And still it is necessary to do much to intensify democratization in order to attract young forces more extensively to science. The editorial boards of the journals of the Academy of Sciences is a specific example. Their membership does not change for decades, and the journals are gradually being transformed from all-union organizations to departmental and institutional ones. Would it not be advisable to introduce a system called "rotation": each individual works on the editorial board for 5 years, is replaced, and then may return again. Changing the membership of editorial boards according to a sliding schedule will open the way for young scientists.

As far as priority directions are concerned, I will mention the problem of climate and space research.

The problem of the climate is a difficult interdisciplinary one, which has not only a scientific, but also a social and political aspect. Unfortunately, in Soviet science a harmonious collective on this problem has not been formed. I will cite a specific example so that I would be better understood.

Probably not everyone knows the concept "nuclear winter" was borrowed from the Americans. the Americans themselves are seriously criticizing it, proposing, in particular, a new term--"nuclear autumn." The main point, however, is that in this scientific problem, which belongs to the area of policy, we do not have our own detailed concept, although there are original results that have not yet become widely known. My specific suggestion is to return once more to the problem of "nuclear winter," judge it on a broader basis, and ensure successful progress. This is especially important as the high-altitude nuclear explosions associated with SDI pose an extreme threat to ecology.

Space research, particularly the development and application of space means of observation to study the environment and natural resources, is the basic theme of my scientific pursuits. We have achievements in this field, for example, a goal program formulated the USSR State Committee for Science and Technology has been successfully completed, but there is also a serious lag given the fact that much capital is being spent on the development of this field of space research. The budget of only one institution of the the USSR State Committee for Hydrometeorology and Environmental Control--the State Center for the Study of Natural Resources--constitutes approximately one-fifth of the budget of the Academy of Sciences. This lag is due solely to irresponsibility and laxity.

Such irresponsibility is also being carried over to international cooperation. The talks on cooperation along the lines of Interkosmos are far from always conducted on a competent basis with the involvement of prominent Soviet

specialists. I propose organizing a serious scientific discussion on the state and future of space research on natural resources.

In conclusion a few words about the draft of the Ecology Program, which is being prepared. It needs serious improvement. And a close union of social scientists and natural scientists is necessary in order for a real Ecology Program to appear.

Academician A.A. Bayev, academic secretary of the Biochemistry, Biophysics, and Chemistry of Physiologically Active Compounds Department

I would like to say a few words first about the basic research which has been conducted at the institutes of the Biochemistry, Biophysics, and Chemistry of Physiologically Active Compounds Department. To assert that it is at the front line of modern biological science would be a clear exaggeration. But, on the other hand, it is also an indisputable fact that we are attaining the front line and are even the leaders in some directions. It is sufficient to mention the research on the structure and functions of bacteriorhodopsin, a photosensitive bacteria protein, the structure and functions of membranes, the structure of chromatin--the basic structural matter of heredity--the organization of the genome of higher organisms, the structure of ribosomes, and so on. Here the situation can be compared with that which occurs during marathon races, when first one and then another runner breaks ahead of the general mass of runners and thus leads the entire group.

But, of course, it would be incorrect if we limited ourselves in our evaluations just to successes of the past. There are a great many scientific themes that we are just beginning to develop, in which the expectation of quick success would be unjustified and premature. One of these is protein engineering, that is, the artificial laboratory production of new proteins that do not exist in nature--hormones, enzymes, and other substances that have one medicinal effect or another.

For us the biology of mammalian cells is also a new and, moreover, practically important direction. Until now mainly microorganisms were used as bioreagents during biological developments. Now it is necessary to use cells of higher organisms (animals), which contain the necessary enzyme systems. Follicle-stimulating hormone, which is important for agriculture and without which it would be impossible to obtain egg cells from highly pedigreed cows and subsequent offspring, can serve as an example. Animal cell cultures are needed to produce it. And for this we should develop the biology of mammalian cells at an intensified rate.

Molecular oncology contains the key to understanding and, consequently, preventing and treating cancer. Research in this rapidly developing field of science has already led to many important results, and we have the right to expect new gains.

Molecular bioelectronics is a new issue for physicochemical biology. The development of this direction will help create semiconductor elements whose memory capacity will be thousands and, perhaps, millions of fold greater as

compared with ordinary ones. We are beginning research in this field in response to the decisions of the 27th CPSU Congress.

It goes without saying that cellular and genetic engineering will be developed further, because these directions not only have not been exhausted, but, on the contrary, are just now beginning to yield fruits.

It is impossible not to dwell on works which are of an applied nature. Here it is first of all necessary to mention biotechnology. In its importance, consequences, scale, and essence this direction, which is now being developed intensively, conforms to the decisions of the 27th CPSU Congress.

The Academy of Sciences is the founder of biotechnology as a scientific direction. However, the latter has now moved from the departmental framework and become the country's common property. Only 10 years have passed since the emergence of this direction, but its numerous achievements are well known: it is now possible to consider assimilated the production of human leukocyte interferon, interleukins, human insulin, and live vaccine (variolar and hepatitis). However, these preparations are covering the long path of biological and clinical tests and will far from immediately reach the user.

Many agricultural institutes of the system of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin and the State Agroindustrial Committee are using modern methods of cellular engineering and biotechnological approaches. New varieties of rice, virus-free potatoes (super-superelites, that is, plants that are absolutely free of viral infection, are being produced), salt-resistant alfalfa, and new varieties of sugar beet have been obtained.

The enormous growth of young personnel--biotechnology specialists who work at academic institutions and in industry and agriculture--is gratifying.

In conclusion I cannot but say that the Comprehensive Program of Scientific Cooperation of the CEMA Member Countries is not being ignored, agreements have been concluded on all the points, so that we are full of optimism and believe in the success of this measure.

Academician V.L. Ginzburg

If the shortcomings in the work of the Presidium of the Academy of Sciences are not discussed, they will never be eliminated. I have criticized the Presidium more than once: at the General Assemblies of the USSR Academy of Sciences in 1976, 1984, and 1985 and in VESTNIK AN SSSR (Nos 4 and 11 of 1986). In my view, there are two key shortcomings in the work of the Presidium. The first of them is extreme centralization that is not supported by actual opportunities to settle issues promptly; as a result the Presidium has literally been choked with work, and some issues remain unresolved for years. The role of the departments was reduced in the process, they did not have the opportunity to assume a significant part of the work. Inasmuch as the new president mentioned the necessity of substantially increasing the departments' role even in his brief acceptance speech, I have the opportunity not to say more in this regard and to concentrate attention on the second key

shortcoming in the Presidium's work. It consists in the loss of contact between the Presidium and the General Assembly and the collective, which consists of approximately 800 academicians and corresponding members. How is this loss of contact expressed?

All elected organs in the Soviet Union, beginning from the CPSU Central Committee and ending with voluntary sports societies, report back during their reelection. The Presidium of the USSR Academy of Sciences is the exception.

The reelection of the Presidium was conducted 1985, but it took place formally, without a report on its work. To the question of how it is possible to conduct the reelection in this way, they most often cite the annual reports of the chief scientific secretary of the Academy of Sciences. But the important and useful annual report of the chief scientific secretary cannot replace the report of the Presidium, which is elected for 5 years. Moreover, the existence of annual reports makes it possible in the report of the Presidium to focus attention on what as a whole has been done for 5 years and what it is necessary to do in the next 5 years.

Realistic discussions at the General Assemblies of such very important themes as the organization of basic research and the coordination of scientific research throughout the country are needed. As far as I remember, the question of academic graduate studies, which need revision, has not once been discussed. A large number of problems are connected with the publishing and information activity of the Academy of Sciences, but this has never been discussed either.

More than 200,000 people work at the Academy of Sciences, 57,000 of them are scientific associates. There are great difficulties with housing and with providing passes to sanatoria and rest homes. Does this issue really not deserve discussion during the report of the Presidium? Finally, the work of the Presidium itself and the performance by its members of their functions should be reflected in the report.

I think that it is necessary to include in the Charter of the Academy of Sciences the point that the Presidium should report back on its work and be reelected only after this. It is also necessary that after the election of a new president, as has happened now, he, having become familiar with the affairs of the Academy of Sciences, after a specified period should set forth his own program, tell about what conclusions he has come and what he proposes, with the subsequent discussion of these proposals.

The main thing is the close interrelationship of the Presidium with the General Assembly. It is necessary that, when addressing the assembly, we would arrive at some sort of results, and not practice the art of public speaking. Today I was pleasantly surprised that Corresponding Member of the USSR Academy of Sciences A.S. Khokhlov, while speaking, cited certain responses to the speeches. This occurred for the first time, but should be a system.

Our speeches should be of use. But my personal experience in this respect is not consoling. In 1986 I spoke at the General Assembly about academic

graduate studies, asserting that they do not meet today's and especially tomorrow's needs (see VESTNIK AN SSSR No 9, 1976, p 57). We could train scientific personnel for the entire country, but this is not being done. I wrote about this in IZVESTIYA and LITERATURNAYA GAZETA and spoke about it at the annual General Assembly of the USSR Academy of Sciences in 1985 (see VESTNIK AN SSSR No 6, 1985, p 46); and I was outraged that my proposals have never been discussed.

The 1966 Decree on Awarding Gold Medals and Prizes of the Academy of Sciences, which are extremely important for providing incentives to scientists, has become out of date. Over the past 13 years I turned to the Presidium regarding this topic more than once and have spoken about it at the General Assembly of the General Physics and Astronomy Department, but have not received a response from the Presidium. In 1985, after I mentioned this again in my speech at the academy's annual General Assembly, it was proposed that I quickly "freshen" my plan. I went to the Presidium, and everything was done in a day. After half a year I received a document: a commission on improving the statute on medals and prizes had been created. To this day the commission has not met once, that is, in 13 years a question, on which it is necessary to spend about 3 hours, has never been settled. This cannot be tolerated.

Such a provision should be introduced in the Charter (see VESTNIK AN SSSR, No 11, 1986, p 38) that the Presidium would respond if only once a year to the requests and proposals of academy members, which have been expressed orally or in writing (it is necessary to regulate this) at the General Assemblies of the departments, at the annual General Assembly of the USSR Academy of Sciences. The discussion of those questions, which have been posed by academy members at least once each year, should also be included in the program of work of the Presidium. An hour or two at each Presidium meeting is now devoted to scientific reports. It seems no less important to me to discuss at the Presidium meetings the remarks or proposals, which were made by the members of the General Assembly.

All of our difficulties, both on scale of the country and on the scale of the academy, are divided into two categories: objective and subjective. Objective difficulties--when there are not enough equipment, construction capacities, and so on--are very distressing. Subjective difficulties--when we have everything in our hands, but bureaucracy and the inability to work interfere--not only are distressing, but also arouse indignation, they must not be tolerated. The Academy of Sciences is our common home, and most of us cannot look indifferently at what is happening at it. The Presidium and all those who want to help it have no more important a task than the elimination of the existing shortcomings. Only after the accomplishment of this task will we be able to see the USSR Academy of Sciences flourish.

USSR Minister of Geology Ye.A. Kozlovskiy

In the decisions of the 27th CPSU Congress the five-year plan is specified for us geologists as a five-year plan of the further increase of geological exploration operations, a five-year plan of the increase of the effectiveness and quality of preparing proved mineral deposits for commercial development. In accordance with this a substantial growth in volumes of geological



exploration operations, which are being increased by 1.4-fold as compared with the 11th Five-Year Plan, is envisaged, the capital investments in petroleum and gas exploration are being increased by 1.7-fold, while the amount of deep drilling is being increased by 1.5-fold. Such imposing tasks require new approaches and the energetic introduction of the achievements of scientific and technical progress in geological exploration work. The leading development of basic scientific research and the intensification and increase of the effectiveness of applied scientific developments are also necessary for this.

The reorganization and retooling of the geological service are now under way, its economic mechanism is being improved. Compared with the 11th Five-Year Plan the volume of introduction of new equipment and base technologies is being increased by 1.5- to 2-fold. It is planned to increase by 2.3-fold the introduction of nonexplosive vibration sources in seismic prospecting, nuclear geophysical methods by nearly twofold, and computer hardware by fivefold. Programs on the radical improvement of the quality of geological exploration operations, the retooling and renovation of production, the saving of material and technical resources, the reduction of the metal content, and others will be implemented during the 12th Five-Year Plan. It is envisaged to obtain 80 percent of the increase of work volume by the increase of labor productivity.

The essence of the reorganization of the economic mechanism of the system of the USSR Ministry of Geology, which is being carried out, reduces first of all to the creation of an economic mechanism that effectively prevents the unjustified increase in expenditures. It will be based on strict standards of expenditures, on their connection with specific results of geological exploration operations--the increase of reserves--and on the dependence of the remuneration of labor on the end result.

Beginning in 1987 all scientific research organizations of the USSR Ministry of Geology are being changed over to the order-job authorization system, the work on the introduction of scientific achievements in practice is being included in their plans. The implementation of the sectorial scientific and technical program, of which all-union programs that have been approved by the USSR State Committee for Science and Technology, the USSR Academy of Sciences, and the USSR State Planning Committee make up about 70 percent, has been started.

As V.A. Kotelnikov stressed in his report, the greatest impact from reorganization can be obtained if the efforts of the Academy of Sciences and the ministries are united in solving the most important scientific and technical problems.

The USSR Ministry of Geology is devoting much attention to developing the concept of the long-range forecasting of the development and assimilation of the mineral raw material base. The ever-increasing role of mineral resources in the country's economy and their strategic significance dictate the expedience of formulating a mineral raw material program. It should include the country's scientifically substantiated need for mineral resources (with an allowance for exports and imports) for the long-range future and specify the

strategy for developing the mineral raw material base of the mining sectors of industry.

The search for and prospecting of petroleum and gas deposits are of the greatest importance. It is necessary to increase in every possible way their proved reserves in the country's most important regions in accordance with the Energy Program. It is planned during the 12th Five-Year Plan in Western Siberia to turn over for development 90 petroleum deposits, in the Caspian Basin to complete the exploration of the unique Karachaganak petroleum and gas condensate deposit and to evaluate the gas reserves of the Astrakhan deposit, and in Eastern Siberia to expedite the development of a reliable raw material base for organizing petroleum production. It is also necessary to provide a reserve of discovered petroleum and gas deposits, the prospecting of which will be carried out during the 13th Five-Year Plan. For this purpose the amount of exploration operations is being expanded. Institutes of the USSR Academy of Sciences, the higher school, the USSR Ministry of the Petroleum Industry, and the USSR Ministry of the Gas Industry are working in creative cooperation with the USSR Ministry of Geology on problems of increasing petroleum and gas reserves. Comprehensive plans for the basic regions have been jointly developed with scientific and production organizations.

The forecast of large and unique petroleum and gas deposits, the elaboration of methods of directly searching for hydrocarbon deposits, the development of the scientific principles and technology for increasing the recovery of petroleum and condensate from the depths, and the optimization of the exploration and calculation of reserves are now urgent as never before. Unfortunately, in the activity of the USSR Academy of Sciences the work on these problems occupies extremely little space, which does not correspond to their importance in the country's economy.

In solving regional mineral raw material problems it is very important to identify additional reserves of raw materials in the regions of operating enterprises. The USSR Ministry of Geology is earmarking 65-80 percent of the allocations for these operations. The introduction of advanced geological exploration technologies and geochemical and geophysical methods has, for example, made it possible to expand the raw material bases of combines of the USSR Ministry of Nonferrous Metallurgy at Rudnyy Altay, the Solnechnyy Mining and Ore Dressing Combine in Khabarovsk, and the Dalpolimetall Association in the Maritime Region. In addition, without developing the proved large and unique deposits of the zone of the Baykal-Amur Railway Line the economy's need for such types of mineral raw materials as copper, tin, and lead cannot be satisfied by the end of the 20th century.

The party's policy of the utmost intensification of production on the basis of scientific and technical progress specifies the need to discover new types of deposits and nontraditional sources of mineral raw materials and to develop advanced technologies for concentrating and processing them. Scientific and applied developments in the fields of geotechnology, hydromineral raw materials, gas hydrates, the metal content of petroleum, and biotechnology are very important on this level. Some achievements in the development of advanced technologies exist at institutes of the USSR Ministry of Geology and the USSR Academy of Sciences. In particular, a technology for processing

high-titanium titanium-magnetite ores has been proposed at the Institute of Metallurgy of the Urals Scientific Center of the USSR Academy of Sciences. And at the same time it is impossible to recognize as satisfactory the situation with the complete use of mineral raw materials. The thorough extraction of such useful components as tin, tungsten, and zinc remains extremely low.

After the April (1985) Plenum of the CPSU Central Committee and the June (1985) conference in the CPSU Central Committee on questions of accelerating scientific and technical progress the USSR Ministry of Geology singled out a number of coordination issues that should have a radical effect on the technology of geological exploration operations. In particular, a unified State Automated System of the Study of the Earth's Mineral Resources and the Collection and Processing of Information at four levels: space--air--ground--well is now being created. The need for such a system stems from the possibility of the more thorough use of geological, geophysical, and geochemical information for the improvement of the methods and technology for searching for and prospecting deposits and the systematic of the territory of the country, as well as from the complication of the search for deposits.

There is a specific reserve for creating such a system in the sector: a fundamentally new technology of the regional study of territory based on geotraverses, ultradeep drilling, and space geological research has been introduced, a number of geodynamic models, including for the territory of the Crimea, have been developed, and a bank of geological industrial data is operational. The organization of an interbranch scientific technical complex, which will unite 59 institutes of different departments and the USSR Academy of Sciences, is envisaged.

First of all methods and means for space geophysics and geochemistry have to be developed and introduced. The major problem of constructing specialized information systems based on fiber optic waveguides and transducers is arising. Its solution is impossible without the participation of the institutes of the USSR Academy of Sciences. The problem of developing and assimilating software for the transmission and automated integrated processing of geological, geophysical, and geochemical information is no less complex.

Only a portion of the numerous scientific and technical problems, in the solution of which the USSR Ministry of Geology will continue cooperation with the USSR Academy of Sciences, are mentioned here. The ministry is also cooperating effectively with the Siberian Department of the USSR Academy of Sciences, particularly on the Physics for Mineral Resources-II Program. At the same time much has to be done to develop more extensive cooperation of the ministry with geological institutes of the Academy of Sciences.

All-union, sectorial, and territorial scientific and technical programs encompassing urgent tasks for the sector constitute the basis of further fruitful cooperation of the ministry with the academy. The gauge of success of our cooperation is the implementation of these programs with the attainment of specific applied results.

Academician V.A. Kirillin, academician secretary of the Physical Technical Problems of Power Engineering Department of the USSR Academy of Sciences

Very complicated problems have arisen today for scientists working in the field of power engineering, and I would like to dwell briefly a few of them.

We have now begun to monitor the consumption of energy resources carefully. And this is necessary because the yearly consumption of different types of organic fuels comes to 0.1 percent of all its reserves. Of course, this is not a lot, but at the same time it is quite significant. It is therefore particularly important to outline a program of measures that should ensure the reasonable use of these resources and the search for new ones.

What is the prospect with energy supply?

The Energy Commission, which is under the direction of Anatoliy Petrovich Aleksandrov dealt with these problems, conducted much useful work and calculated that there is enough recoverable reserves of organic fuel for approximately 250-300 years.

Besides organic fossil fuels radioactive ores as a source of nuclear fuel also exist.

In addition to the named ones there are also energy sources, so-called renewable sources--the sun, geothermal sources, wind, and the energy of the tides. We must not forget about any of these energy sources. It is necessary to think about how to use them better and which of the sources can be of greater benefit.

Here is a negative example. In 1976 a 250,000-kilowatt tidal power plant was built in France. However, in the opinion of French specialists, such plants will no longer be built. There are no more than 20 points on earth where the difference between high and low tides would exceed 10 meters. This shows that this type of energy resources cannot be used on any broad scale. And the cost of such a plant is threefold higher than a hydroelectric power plant with the same capacity. But one should not think of not building tidal electric power plants. Possibly in the northern part of our country such places, where it would be feasible to build such plants individually, will also be found.

But why did the USSR Ministry of Power and Electrification, while already knowing about the experience of constructing a tidal electric power plant in France with a capacity of about 250,000 kilowatts, decide 2 years later to build a similar type of power plant with a much smaller capacity in the northern part of the Soviet Union? Why were considerable assets spent?

A few words about solar energy. It is well known that it is hard to compare anything with the enormous energy of solar radiation. If one were to use just 0.1 percent of the solar power that reaches the Earth, this would be so much that it would suffice for all times and eras.

The problem of using solar energy may be divided into two aspects. First, the obtaining electrical power from solar radiation and, second, the obtaining of heat and hot water supply.

The 5,000-kilowatt electric power plant that was recently built near the city of Kerch is not justifying itself economically. An installed kilowatt of power costs more than 5,700 rubles, while it cost 200 rubles at a thermal power plant and 400 rubles at a hydroelectric power plant. Capital investments were so great that the operating costs in practice are not longer of interest.

Why was it necessary to build near Kerch this electric power plant, every kilowatt of which has such a high cost?

The USSR Ministry of Power and Electrification, which was the builder of this electric power plant, cannot provide an answer.

There is another way of obtaining electrical power by means solar energy. There are the well-known semiconductor batteries that have found effective use in space because there the very capacity of the units is not great, their run is very limited, while, what is the main thing, they are very reliable.

If one thinks about using this method to build large ordinary electric power plants, it is necessary first of all to consider capital investments. The situation is much better with respect to the question of using solar energy for heating and hot water supply: such units are already now efficient for many regions.

Now about geothermal energy. Like solar energy, geothermal energy can in principle be used in two ways: to obtain electric power and to obtain heat and hot water supply. As far as the first use is concerned, it is feasible to build such electric power plants where there is a spontaneous venting of hot waters or, better yet, steam at the earth's surface. But even under this condition the cost of such plants is so high that the development of efficient, economically profitable designs should be discussed first. As far as obtaining heat is concerned, this matter is nearly resolved. The payback period of such plants, true, is rather long--about 20 years. The lower cost of electrical power and heat at thermoelectric power plants compared with geothermal plants is due to the low cost of coal. One of the cities of Dagestan is now completely heated and obtains its hot water supply from geothermal energy (there are vents of hot water to the surface there).

The last form of power I want to mention is wind power. Several decades ago there were an enormous amount of small units using wind power in the United States. However, after electric power lines reached practically all population centers, units using wind power were eliminated, they remained only where electric power plants are located far away or other sources of energy are absent.

In the USSR there is the Vetroen organization, which produces many small windmills each year. It is necessary to do much more work to obtain large

mills. Research on this topic has been organized at the All-Union Scientific Research Institute of Planning of Hydroprojects imeni S.Ya. Zhuk.

The Physical Technical Problems of Power Engineering Department needs to carefully study all these questions. And the main thing is that significant assets must be released only when they can justify themselves.

Academician G.I. Petrov

I happened to become acquainted with the results of the activity of the commission of the USSR Academy of Sciences that is examining plans for diverting part of the runoff of the northern rivers into the Volga. As is well known, the Politburo of the CPSU Central Committee made a wide decision--to stop the work on diverting the runoff rivers, even though tens of millions of rubles have already been spent. In the process of this acquaintance I was completely astounded by the low scientific level of the work of the Institute of Water Problems of the USSR Academy of Sciences. In the first place, it is determined by the very approach to solving the scientific problem: the forecast of a monotonic decrease in the level of the Caspian Sea was made on the order of the ministry. The forecast was based on simply incorrect mathematics and is contrary to observations. The sea lives its life, its level also rose and fell earlier. Thus, close to Derbent, far from the sea it is possible to see the remnants of walls erected by human hands. Now the water level in the Caspian Sea is rising.

It is surprising with what speed the project to divert part of the runoff of the northern rivers into the Volga began to be implemented. The decision to build a dam in the Kara-Bogaz-Gol Gulf was made just as quickly. Because a reduction in the water level in the Caspian Sea was feared, the gulf was cut off from it by a dam and, contrary to predictions, the gulf dried up in 3.5 years instead of 35. The dam needs to be blown up, but whether the water level in the gulf will be restored is unknown. It is also possible to recall how because of incorrect calculations salt water was brought to the Kherson area for irrigation from the Danube, even though in the Danube it is fresh water.

I think the Oceanology, Atmospheric Physics, and Geography Department should focus its attention on the intolerably low level of work at the Institute of Water Problems, which Corresponding Member of the USSR Academy of Sciences G.V. Voropayev heads, and take urgent organizational steps.

One more brief comment. Now that recertification is under way at academic institutes, there is a sensation that even in the basic sciences those sciences, in which practical results are evident, for example, the development of technology, are considered the main direction. But the basic sciences have their own logic of development, and in the history of science it is possible to see many examples of the enormous influence of scientific developments that were undertaken out of pure curiosity. Let us remember if only Faraday's experiments. I will cite another example. In my youth, when I was a student, I simply could not see why mathematicians are concerned with topology. But then the time came to create completely new computer hardware in our country, and the first computer programs were written by topologists.

I am somewhat disturbed that we have not slowed the development of abstract directions in the basic sciences in pursuing results for practical introduction. This applies to both theoretical and experimental works. Openness during the extensive discussion of scientific themes at institutes and in departments is necessary to eliminate subjectivism in determining the main directions in science.

Academician V.N. Kudryavtsev

In Academician V.A. Kotelnikov's report the state of affairs at the academy was spoken about directly, clearly, frankly, and rather self-critically. The state of affairs in the social sciences was also stated correctly. This state is really complicated and ambiguous. Reorganization here is more than necessary and not simple. Nevertheless, the descriptiveness and declarativeness in judgments, dogmatism, and in a number of instances unjustified rushing forward is a too deep and even chronic disease of many social scientists. Persistent and long-term work is needed to overcome these shortcomings. It also presumes several requirements of a methodological nature.

The main one is to shift to the study of reality, and not only literature, as is frequently the case with social scientists. But an empirical base is needed for this. And not only a statistical one. The role of sociological and other specific research and objective information about social processes is increasing.

Social scientists are called upon not only to study reality, but also to aid the making of decisions in the sphere of economics, including the improvement of the economic mechanism, in the area of democracy and the development of self-management, and to formulate specific recommendations and practical proposals. Some improvement is also occurring here. Comprehensive long-range programs are being created.

The initiative in formulating 10 such social science programs belongs to Academician P.N. Fedoseyev. All of them will require a theoretical base and, consequently, basic research. And here it is difficult to agree entirely with V.A. Kotelnikov in his criticism of the Philosophy Institute for the duration of work. Some fundamental work in the field of philosophy really requires long periods of time, for example, the multiple-volume work on the history of philosophy. The Philosophy Institute has now finished two serious works: "Materialisticheskaya dialektika kak obshchaya teoriya razvitiya" [Materialistic Dialectics as a General Theory of Development] and "Marksistko-leninskaya teoriya istoricheskogo protsessa" [Marxist-Leninist Theory of the Historical Process]. Without such things it would also hardly be possible to engage in specific research. Furthermore, one of the tasks of social scientists, so it seems, is to study the effectiveness of the sociopolitical decisions that are being made. But the appropriate organizational conditions are needed for this. True information about the state of affairs is necessary, base regions for research and the conducting of social experiments are necessary. Nevertheless, many researchers are accepted without the necessary training. Recommendations, which are good in themselves, are

immediately disseminated throughout the country, with all its diversity. And the consequences are sometimes unexpected for one region or another. Social reforms must begin with individual regions and local experiments, and then their sphere must be expanded.

The situation with the social mandate to social scientists is also poor. Of course, we have a common social mandate which follows from the decisions of the congress, but for the present we receive very rarely specific social mandates from interested organizations and institutions.

And there is another aspect of the problem--introduction. Academician Zh.I. Alferov correctly stated that in some spheres of life we must speak of introducing ideas themselves.

This is precisely the case in the field of the social sciences. It is a question of the development of political culture, world outlook, and moral principles in different strata of the population. But now we are not only speaking about this, there are also specific developments, especially by economists and lawyers, on the problem of the economic mechanism and on different spheres of social life. But the matter of introduction has been organized here much worse than in other sciences. Scientists have formulated many proposals about the forms of participation of scientists in practical activity and of associates of state institutions in scientific research; there were also proposals on the scientific appraisal of state decisions. But many of these proposals have not aroused any reaction: positive, negative, or neutral. They, as they say, are simply sinking into the sand.

Two documents on this question: on the introduction of research results in the sphere of economics and in the area of constitutional law, were prepared in the social sciences section. But they were not even been considered. The Presidium of the USSR Academy of Sciences should probably study as a whole the question of introducing results into the sphere of the social sciences.

The reorganization of the work of scientists was also discussed in the report. This is also correct. The changeover alone to a new system of the remuneration of labor is insufficient: this is all the same a half-measure. It is necessary to think about further improving this system, for example, the self-finance of scientific institutions. Why should they all be carried on the budget? Why can they not earn money with their own scientific research? This may also concern the social sciences, if a system of social mandates is organized. For example, a system of work of associates with a guaranteed minimum wage and lump sum payment for completed jobs is possible.

It is also necessary to say a few words about the work of the Presidium of the USSR Academy of Sciences.

In V.A. Kotelnikov's report the work of the commission created to improve the activity of the staff of the Presidium was discussed. The commission considered a number of comments and proposals, including the proposals of Academicians V.L. Ginzburg and A.M. Prokhorov and their complaints about the work of the Presidium and its staff. Many ideas were studied by the commission, but were not then considered by the Presidium itself. Thus, the



commission proposed to exempt departments of the academy of functions that are not characteristic of them and to transfer a number of functions from departments to institutes, for example, the approval of scientific assignments on foreign business trips and the getting of agreements on candidates for business trips to union republics and for practical studies at institutes. And to make departments the decisive instance not only when approving plans of scientific research work, but also when settling other questions, such as the composition of the editorial boards of journals, the payment of bonuses to executives of institutions in accordance with the results of scientific research work, and so on--for 16 points in all. These proposals were sent to the Presidium on 4 April 1984. Of course, the commission should not be relieved of responsibility. But the Presidium of the Academy of Sciences should also have examined these proposals and not kept them in the office.

The rotation and interchangeability of personnel were also properly discussed. It should perhaps be expanded somewhat and streamlined. Incidentally, the 3-year interval between elections to the academy is too long. Why not return to 2 years?

The academy is a self-governing democratic organization of scientists. And it is necessary to retain this nature of its. But what is happening now? There it a large staff that actually manages the Presidium, instead of the Presidium managing the staff. It is necessary to reduce centralization and to establish in this respect greater order--to democratize management.

It is also necessary to speed up drastically the settlement of all questions which concern the social sphere. Perhaps, a special, but quite characteristic example here is the intolerably slow repair of the House of Scientists. It began in 1981. Since then there have been many requests on the part of members of the academy to speed up the repair. Promises have been repeatedly made, but all the deadlines have been regularly upset. Is it not time for the Presidium of the USSR Academy of Sciences to take serious steps and to call to account those who are responsible for this matter?

Academician V.M. Tuchkevich

The collective of the Leningrad Physical Technical Institute greeted with much enthusiasm the decisions of the 27th CPSU Congress and the last CPSU Central Committee Plenum on the necessity of accelerating scientific and technical progress as a basis of the rapid socioeconomic development of the country.

In the problem of acceleration it is possible to distinguish two main parts--they are the intensification and expansion of basic research and the introduction, or more correctly, use of the results of research for practical purposes. The question of developing basic research is, of course, very important and difficult, but I would like to dwell now on the second part of the problem.

At one of the preceding General Assemblies A.P. Aleksandrov spoke of the work of the Physical Technical Institute on monitoring and controlling converter processes in ferrous and nonferrous metallurgy. For several years, the Physical Technical Institute dealt with solving the problem of the increase of

the productivity of these processes, the sharp reduction of defective output, and the production of metal of the necessary quality. As a result systems, which came to be called FTIAN-3, should be introduced into the national economy during this 5-year period, and should yield a great economic impact, were developed.

With the help of its special design bureau the Physical Technical Institute developed and manufactured 12 such systems for operation in industry, which were accepted by the corresponding interdepartmental commission and passed state tests, which is a very rare event for an academic institute. As a result of the tests the systems received the State Emblem of Quality and a recommendation for industrial production.

By now more than 2,000 smeltings have been done at the Azovstal and Severonikel combines, where the FTIAN-3 units are located. The economic impact from using these systems came to many millions of rubles. Suffice it to say that as a result of using the FTIAN-3 the process of smelting is being carried out continuously, without turning down the converter. This is saving time in performing smeltings, which increases the productivity of converter shops and makes it possible to smelt annually in the country several million tons of steel and more without additional capital investments.

It would seem that everything is going well. Having 12 ready systems, the institute could return to the state the 1.5 million rubles spent on their manufacture and receive some additional sums more annually on account of the real economic impact, having allocated them for the development of its own operations and the provision of incentives to the participants in the completed work.

But the academic institute, as it turned out, does not have the right to sell the instruments it manufactured, but if it can, then only for less than their production cost. Thus, the initiative and creative labor, which the Physical Technical Institute invested in this work, which is yielding a great economic impact, are simply not being paid for. The principle "from each according to his abilities, to each according to the results of labor" was advanced at the congress. So why can this great useful creative result of the Physical Technical Institute not be tied to the obtained economic effect in any way? The institute's associates work with great enthusiasm in the shops of combines, setting up their own systems, and in so doing do not receive any incentives, which contradicts the aforementioned fundamental principle of socialism.

The second issue that I would like to touch upon concerns the work of all the country's scientific research institutes. The existing system of training staffs of young specialists and the connection between the secondary and higher school cannot be recognized as satisfactory. Much experience in the training of personnel has been gained at the Physical Technical Institute: for 12 years now it has been connected with the Leningrad Electrical Engineering Institute, where a base chair in optoelectronics has been set up, and with the Polytechnical Institute, where a chair of semiconductor devices and microelectronics has been organized.

When developing the statute on the higher school one should probably include a proposal about the need to divide personnel training into two groups: the creative group, the selection for which of the most capable young people should begin already with secondary school, and the second group--the group of engineers, where the training of skilled specialists for the production, operation, and repair of the instruments and equipment, which are developed by the first group, is carried out.

As far as interbranch scientific technical complexes are concerned, it is possible to hope that by means of them departmental barriers, which are so difficult to fight combat, will be overcome. One should not, however, forget about the small complexes that unite an institute, its special design bureau, and corresponding experimental work. Now when we are limited in the purchase of a number of foreign instruments and equipment, such small complexes are performing very necessary work--they are manufacturing instruments based on the ideas and with the help of the institute.

And the final question. The Physical Technical Institute welcomes the transition to a two-level system of management of academic institutions. It is necessary to switch to a system in order to put an end to the increase in bureaucracy, whose growth under the three-level system is obvious.

President of the Ukrainian SSR Academy of Sciences Academician B.Ye. Paton

The 27th party congress posed extremely complicated and critical tasks for Soviet science--to make breakthroughs in leading directions of scientific and technical progress and to ensure the thorough reorganization of the economy. The implementation of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000 is undoubtedly of great importance on this level. As is known, an exceptionally complex task has to be accomplished--in the shortest possible time to achieve leading positions in the world in five key priority directions of scientific and technical progress.

Of course, the accomplishment of this task is possible only by developing basically new, revolutionary technologies on the basis of the results of extensive, truly basic research.

The fourth priority direction is new materials and technologies for producing and working them. In this area detailed programs of joint work on all the problems in this field have now been formulated and approved and the corresponding agreements on cooperation have been signed. About 150 organizations of more than 20 ministries and departments of the country and approximately the same number of organizations from 9 socialist countries have been involved in the programs. The organizational period is thus practically completed.

At the same time the gained experience has shown the exceptional importance of the serious analysis of the scientific and technical level of the adopted programs and its comparison with the existing and forecast development of the countries of the capitalist West. Without this it is impossible to make sound

decisions and the attainment of leading positions in the world is impossible. Evidently, special subdivisions dealing with an analysis of this kind should be created at the main institutes.

Moreover, the development of new principles of the organization of scientific activity, the combining of science with production, and the improvement of the economic mechanism is necessary. Only on such a condition can the world level in all priority directions of the program be achieved not only in scientific and technical developments, but also, what is the main thing, in production and the economy as a whole.

The detailed coordination of our domestic programs and plans, including the five-year national economic plans, with the assignments of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000 should be achieved. Only such an approach will make it possible to accomplish the outlined tasks. Unfortunately, such coordination does not yet exist in a number of cases, but it is absolutely necessary.

Favorable possibilities for implementing the CEMA Comprehensive Program are being afforded in connection with the recently adopted decrees of the CPSU Central Committee and the USSR Council of Ministry "On Steps on the Improvement of the Management of Foreign Economic Relations" and "On Steps on the Improvement of the Management of Economic, Scientific, and Technical Cooperation With the Socialist Countries." It is important to use them effectively and fully. For the present only first and uncertain steps are being taken in this direction at the academy.

As has been emphasized more than once, an enormous role should belong to interbranch scientific technical complexes. Not by chance are precisely they the main ones for many problems stipulated by the Comprehensive Program of Scientific and Technical of the CEMA Member Countries. However, today they are still operating at far from full capacity. Although the statute on the interbranch scientific technical complex has taken effect, in practice for the present they are still disconnected and difficult-to-manage conglomerates of enterprises and scientific research organizations.

The reasons here are many. In particular, the completely unjustified procedure of placing the developments of interbranch scientific technical complexes into commercial production, which was artificially established by the USSR State Committee for Standards and involves the preparation of an enormous amount of technical specifications and unproductive losses of time on various consultations--at times up to 2-3 years--is interfering. The right to conclude contracts independently, which has been given to the complexes, is not being implemented, and instructions on the procedure of extending credit to main organizations are lacking to this day. A mechanism of transferring currency to accounts at the Foreign Trade Bank from contracts concluded by the main organizations has still not been put into effect. Finally, the influence of the complexes on the science and technology policy of sectorial ministries so far is still inadequate. As a result statements about interbranch scientific technical complexes as "paper tigers" are already being heard.

If such a situation also remains in the future, the achievement, and especially the surpassing of the world level in a number of directions of scientific and technical progress will be problematic and may remain a fond wish.

In the approach to the named problems, B.Ye. Paton said, decisive qualitative changes are needed, and here much depends on ourselves. A number of very important decrees, which are aimed at the improvement of the organization of scientific research in the country and the utmost strengthening of the contacts of science with production, have recently been adopted. At the stage of their preparation we display great activity and say that it is impossible to work without these acts. But then the decrees have been issued, and we implement them poorly, often do not know how, cannot, and at times do not want to take advantages of the rights and opportunities that have been given to us. This is already our omission. The Academy of Sciences jointly with and with the assistance of the USSR State Planning Committee and the State Committee for Science and Technology is obliged to resolve all these questions expeditiously. This also concerns the decrees of the CPSU Central Committee and USSR Council of Ministers on the improvement of the management of foreign economic relations and cooperation with the socialist countries, which were mentioned previously.

A second theme that should be touched on is the increase of the role of scientists in the analysis and substantiation of the reliability and safety of operation of large economic facilities such as nuclear power plants, chemical works, hydraulic developments, strip mines of deposits, and several others. Any miscalculation here may have far-reaching and sometimes tragic consequences. The role of scientists does not lie in dramatizing individual problems. Writers do this successfully. Strict accountability of the academies of sciences for the preparation of truly scientifically sound recommendations and proposals is necessary.

Academic institutes should actively participate in developing new approaches when making decisions on implementing various projects, based not on the immediate interests of individual departments, but guided by the tasks of preserving the environment for future generations and ensuring the efficient use of nature.

Take, for example, the problem of constructing such a large water management complex as the Danube-Dnieper canal. According to preliminary estimates, it will cost the state more than 30 billion rubles. Meanwhile valid doubts about its necessity are already now arising. Building the canal will create the problem of the desalinization of limans that are separated from the sea, which involves negative ecological consequences, and of the development of expensive and complex technology for cleaning the water of the Danube, which has been polluted by the discharges of many countries, and of the rise of the ground water of irrigated territories and territories adjacent to them, territories, the problem of neutralizing highly mineralized drainage effluents, and a large number of others. The design of the complex has not yet been approved, the State Commission of Experts of the USSR State Planning Committee returned its technical and economic substantiation for serious revision. But, to great regret, the builders have already begun to launch the preliminary operations.

The Politburo of the CPSU Central Committee recently decided to stop all work on the project to divert part of the runoff of the northern rivers to the southern regions. In particular, the task of reducing water consumption in the national economy by 15-20 percent during the current five-year plan is set in it. If the specified volumes of water savings are also ensured during subsequent five-year plans, for the Ukraine by the year 2000 this will be equal to the volume of water, which is it possible to divert through the Danube-Dnieper canal.

Scientifically sound, specific recommendations of the USSR Academy of Sciences and the Ukrainian SSR Academy of Sciences are needed here also. Moreover, it is necessary that these recommendations would not become the property of archives, but would find practical application. Evidently, it is necessary already today to think seriously about establishing an indicator of the water intensiveness of social production and the national income, as has already been done in relation to their power-output ratio and metal content. Joint work with economists is needed here.

Academician A.A. Nikonov, president of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin

The necessity of closer cooperation of the USSR Academy of Sciences with sectorial academies discussed in the report of Academician V.A. Kotelnikov. Without this it will be impossible to accomplish the most difficult tasks facing us on accelerating the country's socioeconomic development. At the All-Union Academy of Agricultural Sciences imeni V.I. Lenin they are striving for twofold integration: on the one hand, with basic science and, on the other, with production. Apparently, the peculiarity of applied sciences consists in general in this.

Great responsibility for solving many major and difficult problems of agriculture rests with agrarian science. In the end the prestige of science also depends on its success in this matter.

There are examples when science and practice find such solutions by joint efforts. One of these is the introduction of scientific developments on intensive grain production technologies. According to the preliminary data for 1986, an additional ton of grain will be obtained from every hectare of winter crops and additional half a ton of grain will be obtained from every hectare of spring crops. The quality has increased, twofold more strong varieties of wheat and fourfold more durum wheats have been purchased as compared with preceding years. For each ruble of additional expenditures on intensive technologies additional output worth 1.8 rubles was obtained. True, for the present these technologies have been assimilated on limited areas. Very much work still lies ahead. But bottlenecks are already visible here: the insufficient skill of people, the weakness of plant protection on account of the absence of domestic pesticides, the incomplete development of the technologies themselves, and a trite approach in some places. For it is necessary to get the new technology to each kolkhoz and sovkhos for which this technology is only one of the components, just a fragment of the entire system of the farm.

Some decisions on increasing labor productivity have also emerged. However, a strange situation is now developing. The countryside is becoming saturated with diverse equipment, fixed capital is increasing, but labor productivity is increasing slowly. A model of the a transition to collectives of intensive labor was developed to correct the situation. It is being tested today in five collectives with the support of the party organizations of Novosibirsk and Kurgan oblasts. The result is a two- to fourfold increase in labor productivity. Wages have increased, but the overall production costs have decreased.

But the collectives that are changing over to such a procedure of work are making their own demands. This first is smooth supply with high-condition seeds, fertilizers, pesticides, fuel, and other resources. The second is provision with expert scientific opinions. And the third is not to give commands from above, people do not want to work automatically, they want to utilize the earth competently and to be responsible managers. This means that the functions and structure of kolkhozes and sovkhozes and legal, social, and economic relations are changing. Here much joint work of process engineers, biologists, sociologists, economists, lawyers, medical personnel, and other specialists lies ahead. And the cooperation of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin and the USSR Academy of Sciences is needed in solving such important problems.

The cooperation of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin with the USSR Academy of Sciences has been strengthened and expanded in recent times. Academician A.A. Bayev has already spoken about this. Joint groups have been created, together with Siberian sociologists, particular with Academician T.I. Zaslavskaya, research on social issues is being conducted. Joint work on the problems of automating and mechanizing agricultural production is being performed. True, the most profound forms of integration--the creation of joint collectives and joint laboratories--for the present are being poorly developed.

A second direction of cooperation is that of training personnel. Agricultural science needs trained specialists in biotechnology, electronics, automation, and other branches of knowledge.

A few words about the integration of science with production. It seems that under present conditions as applied to the agricultural sector it is necessary to speak not so much about introduction as about the fact that science should, as N.I. Vavilov put it in his day, permeate production from top to bottom and about the mass introduction of new technologies and solutions.

These issues are being resolved slowly, but in recent times 103 scientific production associations in the system of the State Agroindustrial Committee and the All-Union Academy of Agricultural Sciences imeni V.I. Lenin, 22 technological centers for grain crops, 53 breeding centers for plant growing, and 22 centers for animal husbandry have been established. A kolkhoz sector of science is being conceived, and production systems are being created. On its path of cooperation with the USSR Academy of Sciences agricultural science

will be able to accomplish its own tasks more successfully and to exert a more effective influence on the acceleration of production development.

Corresponding Member of the USSR Academy of Sciences L.I. Abalkin

The same processes that are occurring in all branches of knowledge are occurring today in economic science. Two main problems face it: the introduction of reserves that have been created in science and the intensification of basic research.

As far as introduction is concerned, some positive changes are being observed in the Economics Department. Closer contacts with planning and economic organs are being established, and joint discussion of problems has become more frequent. A transition to the next stage--from joint discussion of problems to joint development--is now visible. A "triangle": academic institutes, sectorial institutes, and departments themselves, such as, for example, the State Planning Committee, has emerged here.

Some experience of cooperation has been gained, including the creation of temporary collectives on an interinstitute base. This work has been developed especially actively under the Commission for the Improvement of the Economic Mechanism that has been organized. A group of representatives of three institutes: the Economics Institute, the Central Economics and Mathematics Institute, and Systems Research Institute, which has been charged with analyzing state acts concerning issues of the economic mechanism, which have been adopted in the last year and a half, was also recently formed.

At the same time here its own difficult problems also exist. The aspiration for contacts with departments and the obtaining of their approval and confirmation from also contains certain dangers. The temptation to adjust to convenient decisions and to transform science into a simple tool for substantiating these decisions, which leads to the loss of autonomy and independence of research, is arising. For it is difficult to imagine that state departments are able to be impartial arbitrators and judges in resolving economic issues that belong to their competence.

As far as fundamental research is concerned, many complicated problems are also arising here. Today the life of our country and the socialist countries and world development have brought forth a number of fundamentally new phenomena. We need to comprehend a large number of new issues and fulfill the social mandate that was formulated at the 27th CPSU Congress and at the conference of heads of social sciences departments. Society and science have the right to expect from us, moreover, in the shortest time, progress in in comprehending such a fundamental problem as the dialectics of the interaction of productive forces and production relations, in the analysis of the more and more complex, multifaceted, and contradictory structure of property relations, in the modern understanding of cooperation, and in the realization of the fundamentally new conditions of the country's economic development.

All this is impossible without turning to basic science, first of all to the political economy of socialism. But when we have turned to it for answers, on closer inspection it turned out that it is not prepared to answer such



questions. Enormous responsibility for this rests with the Economics Institute of the USSR Academy of Sciences. This summer PRAVDA published critical material on the decrease of the level of economic research. The institute's administration and its party organization agreed with the criticism of PRAVDA and admitted that the institute has lost the role of a generator of political economic ideas. It is necessary to return this role.

The current stage in the development of science is characterized by the interpenetration of the sciences. They have already spoken here about the mathematization of the sciences. This is one of the classic and most noticeable phenomena of interpenetration. It seems that it is possible to speak today of another line of interpenetration--the economization of the sciences and above all the technical sciences. Specific, very interesting examples were also cited in the speeches at the assembly. If such interpenetration does not exist, it is impossible to guarantee success in implementing the outlined policy of acceleration. The work being done at the Economics Institute shows that if we do not fundamentally change our approach to many scientific and technical solutions and to the estimation of their economic impact and if we turn the introduction of robots and flexible machine systems into an end in itself, instead of renovating the national economy we will ruin it in the next 5-10 years. Similar "progress" can prove to be disastrous and destructive. This is a very serious problem and, it seems, deserves to be discussed at one of the meetings of the Presidium of the USSR Academy of Sciences.

The question of personnel was heard very sharply in the report of V.A. Kotelnikov and in other speeches. But the problem of the age of the full members and corresponding members of the Academy of Sciences cannot be solved as an autonomous, independent one, in isolation from the general system of the training and promotion of personnel. This is a very small tip of the huge iceberg of science, and certain general processes occurring in science are reflected in the aging of academy members. Here one should not judge from the average figures. For example, there is one 70-year-old doctor of sciences, two junior associates, each of whom is 23, are added to him, and on the average 39 is obtained. Yet not the average, but the real age of scientific associates and the real possibility of ensuring continuity in science are important.

The situation is very alarming in economic science. Those scientists, who have constituted its glory and pride, have reached the 80-year mark. This is an entire generation. Now the group is born approximately between 1928 and 1935, the group that has passed the 50-year mark and is approaching the 60-year mark, is the most active. After that there is a void--there is no one to replace them.

The problem lies not simply in rejuvenating the staff of scientific associates by attracting graduates of universities. We have a colossal gap in the staff of doctors of sciences who could head a laboratory or scientific center. Now the emphasis should be place on people 25-35 years old, who should find the opportunity to realize themselves. In all 5-8 years will be spent on this, but it is necessary to begin this today. We have been saying and writing a lot about restoring doctoral studies. It is now time to shift from words to

deeds. But doctoral studies in themselves will not help. To solve this problem in a normal manner, young persons must be given the possibility of obtaining a laboratory or subdivision and thereby advancing. There are initial stages of growth that are connected with graduate study. Problems have also accumulated here. They all have specific solutions that must be sought before it is too late to ensure a more or less natural succession of generations in science. This question could also be the topic of discussion in the Presidium of the USSR Academy of Sciences.

Academician A.M. Prokhorov, academician secretary of the General Physics and Astronomy Department of the USSR Academy of Sciences

The General Physics and Astronomy Department is working on fundamental problems in the most diverse areas of physics: spectroscopy, optics, plasma physics, solid-state physics, semiconductor physics, and so on--and in many directions holds the leading place. But, unfortunately, we are very much behind in some fields, and this cannot but worry us.

The department has rather close ties with industry, which is helping with both instruments and staff units, otherwise the department's position would be a lot worse, particularly because there has been a reduction in scientific personnel in the field of physics in Moscow and Leningrad (we do not have that many physicists, but they are nevertheless being reduced regularly). It is necessary to note that industry sets to work only on those developments that have been brought to completion, and the institute's authority is determined by this. Of course, industry will not start helping in conducting experimental research, while the department's budget is such that some institutes receive more money through contractual jobs than through the budget. This is an abnormal situation, and it is necessary to correct it.

The development of new advanced technology is the foundation of scientific and technical progress. In this connection I would like to dwell on one very important problem--the development of the element base for computers. In our industry the output of serviceable complex microcircuits is low. New plants, which are expensive and for which, incidentally, there are no personnel, are being built to provide users with these circuits. Part of the resources allocated for building plants to manufacture circuits based on the existing technology should be allocated for the accomplishment of the fundamental tasks connected with the component base of microelectronics. A new technology--molecular epitaxy, a so-called MOS-hydride technology--needs to be developed. We will not be able to develop powerful, highly reliable computers with small overall dimensions, as well as set up the series production of computers with a comparatively low cost on the basis of the existing element base. It is possible to do this only owing to a new element base, which, unfortunately, it being very poorly developed in our country.

The department's institutes could set to work on solving this problem jointly with the institutes of the Information Science Department and other institutions of the academy and, of course, with the active participation of industry. For this it is necessary to settle quickly the question of the material and technical supply of the institutes.

It is necessary to develop and organize the output at the Academy of Sciences of sets of laboratory technological equipment for microelectronics. The equipment being supplied by our industry does not meet the demands of academic laboratories. Foreign firms manufacture sets of small laboratory units equipped with diagnostic systems. The development of promising circuits and instruments and technological processes is being carried out on such equipment at universities and laboratories abroad. It is necessary to plan the development and extensive output of such under the supervision of the scientific production associations of the Academy of Sciences with the participation of the institutes of the General Physics and Astronomy Department and the Information Science, Computer Technology, and Automation Department together with the CEMA countries. Without this we cannot move forward.

There are other problems that need to be discussed. For example, the publication of scientific literature on physics, which at the Science Publishing House, just as 20 years ago, makes up only 2.7 percent of the entire amount of scientific literature, even though the Department of General Physics and Astronomy is the largest at the academy.

The situation with sending our scientists to capitalist countries is also poor. In order to know the level of foreign technology, it is necessary to leave and make contacts with scientists, but, unfortunately, there is an acute lack of money for this, just as for purchasing foreign scientific literature. Great difficulties are connected with the lack of copying equipment.

As far as limiting the time of institute developments to 3-4 years is concerned, this depends on the complexity of the problems.

Our industry has undertaken to develop lasers, the need for which is very large. But it is necessary to increase their service life from 1,000 to 2,000-3,000 hours in the near future. Lasers purchased abroad operate significantly longer because basic research on the aging process is being conducted there, while in our country they are dealing too little with this, since it is unprofitable.

The institute's activity needs to be evaluated in accordance with the yield that its developments provides, and not in accordance with formal criteria (to which one could also assign the necessary condition that the time of a development would not exceed 3-4 years).

The Institute of General Physics of the USSR Academy of Sciences is set for battle. In this five-year plan it intends to introduce in industry a number of developments, including solid-state lasers for machine building that, as experience has shown, are very promising, but effective help is needed for successful progress.

Academician M.A. Sadovskiy

Many fundamental decisions, which are made by the Presidium of the USSR Academy of Sciences, reach the institute level in such a deformed form that at

times they become not only useless, but also obviously harmful. I will limit myself to a few examples that confirm the validity of what has been said.

At the General Assembly of the USSR Academy of Sciences it has already been noted that the joint work with countries in the socialist community is not progressing favorably. The Institute of Earth Physics imeni O.Yu. Shmidt of the USSR Academy of Sciences is performing work with scientists of Bulgaria, the GDR, and Czechoslovakia, and is performing it with little efficiency. The point is that the quota we have is only sufficient to meet at times in one of the countries and briefly tell about the obtained results. In fact there is no joint work.

But at the same time it is completely obvious that the combining of both the efforts of specialists and the laboratory equipment of various countries in solving some problem could accelerate the work significantly. Institute directors must be given the right to invite scientists from the socialist countries for 2-4 months by way of exchange.

A few words about speeding up our activity. The instruments, which the associates of the Institute of Earth Physics use, are limited in application: a maximum of 100-200 of them a year are needed. The industrial organization does not accept such orders--it is not profitable. We have to make the instruments ourselves, and the experimental design bureau of the institute makes them. However, the quality of these instruments is worsening from year to year. The reason is very simple: 60 percent of the machine tool equipment of the institute's experimental design bureau is more than 25 years old. Of course, it is impossible to perform on such machine tools the precision operations connected with manufacturing instruments. Only 5 percent of the machine tools are 10 years old or less. We cannot obtain new machine tools, particularly because the Academy of Sciences obtains them in limited quantity, first of all for its own large instrument-making plants. But I think that these plants cannot solve the problem of providing the institutes of the USSR Academy of Sciences with the necessary equipment without the development of small specialized production bases under the institutes.

The question requiring the most serious attention is that of construction. Although Academician V.N. Kudryavtsev thoroughly examined it in his speech, still I will also share my own sad experience. The institute received 6 years ago from the Moscow City Soviet a house on the Warsaw Highway, which was in need of repair and renovation. The Main Administration of Construction of the USSR Academy of Sciences refused to perform the repair work, the Administration of Affairs of the USSR Academy of Sciences also rejected them. The institute began the repair on its own. We cannot, however, finish it without the help of construction specialists. Meanwhile we should install in this building computers and other equipment worth on the order of 1 million rubles, which is necessary for developing work on forecasting earthquakes. For the present the equipment is lying in crates, the institute has already received a reprimand for the insufficiently effective use of the computers. But we need only 40,000-50,000 rubles of help from builders.

"Paper supervision," it seems to me, has recently increased excessively at the Academy of Sciences. We receive sometimes an enormous quantity of orders from

the Academy of Sciences on minor questions. I think that the role of the directors of the academic institutions should not be disparaged. The Presidium should demand initiative from them and not give petty instructions.

I will dwell on the scales of such work, which is being performed by the associates of the institute, as work in vegetable storehouses and kolkhozes, street cleaning, and so on. Almost 6,800 man-days given the 700-man Moscow staff of the Institute of Earth Physics was spent on this in half a year. In general associates of the institute are also coping rather well with these assignments, although they do not understand why scientists need to engage at vegetable storehouses in removing rot. I think that such nonproductive expenditures of the working time of scientific associates should be stopped.

Academician I.I Mints

I would like to add a few proposals to the very interesting report of Vice President of the USSR Academy of Sciences V.A. Kotelnikov, which is full of profound proposals on the means of reorganization. The first of them is the necessity of disseminating true information about the Soviet-American summit meeting in Reykjavik. The results of the meeting were discussed at a meeting of the Politburo of the CPSU Central Committee. The task of scientists, first of all social scientists, is to promote our party's decisions on this question.

As a historian I will allow myself to remind you of the words that V.I. Lenin spoke not long before the revolution and that sound very timely today. The contrasting of socialism to capitalism, V.I. Lenin said, is being done today not only by us Bolsheviks, it is understandable to the entire proletariat, a portion of the bourgeois politicians also recognize it. But now this is already insufficient--the task of not only the general opposition of imperialism and socialism in general terms, but also of raising specifically the question of specifically how socialism is settling the question of war and of the high cost of living, is arising. M.S. Gorbachev used precisely this Leninist tactic at Reykjavik. The Americans spoke in general about peace, about the impossibility of winning a nuclear war, and so forth. But Comrade Gorbachev interrupted them: We have heard all that, enough of repeating the general principles that everybody knows, be specific. Here is our plan--to reduce mass-destruction weapons by 50 percent, to eliminate medium-range missiles, and so forth, which everyone knows. Backed against the wall, R. Reagan had to expose himself and openly admit that SDI is a weapon of aggression. This Leninist approach of Comrade Gorbachev and the self-disclosure of Reagan need to be explained and promoted.

It would be useful for historians to engage in publishing small works on this theme and print them not over the course of 3-5 years, as is usually the case, but in a shorter time. It is possible to write a series of pamphlets on the theme "Socialism-Imperialism: Human Rights" and "Socialism-Imperialism: The Struggle for Peace." This would be a great aid to workers of the ideological front in promoting our party's ideas and a contribution to the development of Marxist-Leninist ideas at the present stage.

My second proposal concerns the question of the human factor, which is extremely important in the present campaign for acceleration in all sociopolitical fields. But it seems to me that the continuity of Bolshevism has been overlooked in this question. How can one not remember the famous thesis of K. Marx, which Lenin considered one of the most important in Marxism, namely: the deeper the upheaval is, the greater the mass of those participating in it should be. Here, too, historians are in debt--it is possible and necessary to publish a number of works on the continuity of Bolshevism.

Finally, I would like to emphasize the importance of the question of introducing scientific results into practice, about which all the speakers have spoken. With a feeling of great bitterness we hear how years are spent in order to overcome bureaucratic obstacles and introduce an invention into practice. Evidently, additional efforts should be made for the optimum settlement of this question so that inventions, which at times are of enormous national economic significance, would be implemented as quickly as possible. The need has probably arisen to have some government organ that will deal specially with introduction. It makes no sense to establish such an organ, but we do have the State Committee for Science and Technology: it is necessary to establish in it a department, sector, or group of introduction, by means of it the question of introduction can be improved significantly.

Academician A.A. Dorodnitsyn

All scientists, who work in the field of information science, greeted with enormous satisfaction and enthusiasm the program "The Electronization of the National Economy" (the term is perhaps not completely apt: the name "the informatization of the national economy" would have been more adequate).

But the days of rejoicing passed, and the dull workdays came. And a situation that is difficult to understand is arising. For about 20 years now I have had occasion to deal with distributing computers to the institutes of the Academy of Sciences, but such a situation as in 1986 did not yet exist. For example, 26.1 percent of the academy's order for YeS 10-66 computers has been satisfied, which does not ensure even the deliveries that were stipulated.

Thus, a strange discrepancy is occurring: a decree on allocating computers to some institute is issued, but this decree does not contain any decision on the additional allocation of computers, and the institute must be provided with computer technology out of the same empty pocket of the Academy of Sciences.

The situation is a lot worse with the YeS 10-46 computer. Only 6.25 percent of the academy's order for it was satisfied, and this computer could satisfy 75-80 percent of an institute's need for computer operations. Previously the academy's orders were also not fully satisfied--by approximately 50 percent. But then even the most impatient institute director agreed to wait. And now the question, to which institutes to allocate computers, has to be settled by casting lots. Orders for two-computer complexes are not being satisfied at all. How can scientific research be "electronized" under these conditions? Our new president will have to take the most decisive steps without delay to cut this Gordian knot.

Now a few words about a completely different matter. In the last part of his report, V.A. Kotelnikov raised the very urgent topic of rejuvenating the institutes, which is closely connected with the task of increasing the success rate of scientific research. His recommendations may be accepted completely.

But doubt about their implementation is arising. Cutbacks were also made before at the Academy of Sciences, and usually the situation is as follows: if a person who is not especially suited for scientific work, but works falls victim to a cutback, he is not too distressed, he will find a job quickly, and with a higher salary than at the academy. But if it concerns a loafer, and one with grievances, nothing will come of this. The board of directors and party and trade union organizations are of the common opinion of the necessity of his cutting, but he will turn to the court, which will come to his defense and will force him to be reinstated. The fundamentals of labor legislation were established back during the New Economic Policy. From that time our society's social structure has changed radically, but labor laws have remained essentially unchanged.

Increasing the effectiveness of scientific research is an urgent task, but the taking of specific measures in this direction is faced with completely illogical obstacles.

Vice President of the USSR Academy of Sciences Academician V.A. Koptug,  
chairman of the Siberian Department

The main task of the Academy of Sciences--the leading development of basic research--has always faced us, and the closest attention has been and will be devoted to it, inasmuch as revolutionary changes in equipment and technology originate precisely here. At the same time it is obvious that the potential of scientific developments that the academy has already accumulated makes it possible to make a mighty spurt in scientific and technical development, provided these results are quickly implemented into practice. It is not surprising that at both the previous and present assembly much has been said about the problems of transferring academic developments to the national economy. Diverse forms are being tested, and new ways of solving these problems are being sought. The Siberian Department of the USSR Academy of Sciences is also working in this direction.

The making of an "inventory" of the developments completed by the Siberian Department was an important step, the results as a whole turned out to be quite significant. Today 23 especially important works have been included in the assignments of the USSR and RSFSR State Planning Committees and about 100 developments have been agreed upon with ministries of various types for implementation during the 12th Five-Year Plan. But there are circumstances that can interfere with the use of the planning lever of introduction.

First, in reorganizing its work, the USSR State Planning Committee is gradually making a transition to planning based on generalizing indicators of the development of sectors as a whole. This corresponds to the spirit of the times, this is the correct line, but in so doing the aspiration to eliminate specific developments, often very significant ones, from the national economic

plans is being observed. If this trend continues, a very important mechanism, which prompts, and in a number of cases compels, sectors to introduce new developments--a mechanism that should constantly operate in the framework of planned management--will be lost.

Second, after the operations on introduction are agreed upon with the ministries and have been included in the sectorial plan, it is nearly impossible to obtain information about the progress of introduction. The academy does not presently have a monitoring mechanism that would make it possible to track the implementation of agreed-upon developments in one sector of the national economy or another, if they are included in the sectorial, but not the state plan.

A very authoritative interdepartmental commission, which is oriented toward accelerating the practical implementation of the most important developments, operates under the USSR State Planning Committee. It is doing a large and important job. In fact it is a "conflict commission" between science and the sectors. With its help the Siberian Department was able to resolve a large number of important questions of introduction, which in direct contacts with sectors simply were not settled. And if the planning levers, which were spoken about above, are lost, the work of this commission will also lose effectiveness.

The Academy of Sciences needs to work out a unified and clear point of view on the role of planning levers and on the entire system of guiding academic developments through planning organs into the national economy.

Given the scale and, accordingly, the inertia of a significant portion of our industry, we are experiencing difficulties in assimilating developments that require the output of a limited product assortment. The policy of creating engineering centers, pilot works, and associations with the participation of the Academy of Sciences, which are taking upon themselves the solution of similar problems, was properly adopted. This practice must be expanded, remembering that in questions of introduction the academy will always prove it is correct, when it brings developments up to small series or to the pilot industrial checking of the technology. This means that prime importance needs to be given to the question of developing design bureaus and a pilot production base within the Academy of Sciences.

A very serious question was raised in the report of V.A. Kotelnikov. It is a matter of the development of new forms of the integration of science with industry, particularly interbranch scientific technical complexes [MNTK's]. This is a form that is just beginning to be assimilated. The criticism voiced by Comrade Ligachev in address to the Academy of Sciences is correct. Complexes are being organized and for the present are developing their work slowly.

A few words about the Katalizator Interbranch Scientific Technical Complex, of which the Catalysis Institute of the Siberian Department of the USSR Academy of Sciences is the main organization. The complex's structure has now been formulated. It includes 14 scientific research institutes and enterprises of 6 ministries and departments. The national economic importance of the complex



is very large. Almost 80 percent of the descriptions of new catalysts, which it is planned to develop during the 12th Five-Year Plan for the ministries of the chemical and petrochemical industries, as well as the mineral fertilizers industry, will be created within the Katalizator Interbranch Scientific Technical Complex.

Work on organizing the complex is still far from complete. Now it is important, without being frightened of the difficulties and critical comments, which are inevitable in this matter, to continue what has been begun. It is necessary to leave the new organizational form work for 2-3 years in order to give it a fair appraisal and to outline further steps on its improvement. The hasty changeover of interbranch scientific technical complexes to the path of sectorial management can ruin the very idea of their interdepartmental orientation.

There is another important question--certification of scientific personnel at academic institutes. This is important in addition because the Academy of Sciences has "aged." At the Siberian Department, true, during the past 5-year period such an indicator as the average age of institute directors did not change and remained in the 55-year range. But this does not mean that we have solved all the problems at the upper, middle, and lower levels. When certification begins, it is first of all necessary to support the moral and psychological climate in the collective. For if the leading role of the management of an institute, the scientific council, and the party organization is lost and if petty arguments and squabbles have started, no automation of research and no stimuli for introducing works into the national economy will ensure the increase of the efficiency of work, because the collective is not working at all.

Unfortunately, it happens that when carrying out the certification and reorganization of the collectives, which, as the management believes, are not working efficiently enough, a flow of complaints to all instances, with which it is difficult to cope, arises. It seems that if a complaint was examined once in the central organs, one should not return to the examination of repeated complaints. And it is advisable within the USSR Academy of Sciences to set up conflict commissions of different levels, which are capable of competently examining problems that have arisen within the academy and making authoritative judgments. This will make our movement along the path of reorganization easier.

Corresponding Member of USSR Academy of Sciences I.T. Frolov

Much is currently being done in the journal KOMMUNIST to improve the coverage of the problems of science. Its important task after the 27th CPSU congress was to link its work as closely as possible with the work of the Academy of Sciences. The assembly participants, of course, have already directed attention to the publication of several articles of our prominent scientists. This direction will also be developed further--a department of science and education has been specially created in the editorial board.

Now, after the CPSU Central Committee's decree on the journal KOMMUNIST, a new rubric has appeared on its pages--"Debates and Discussions." By means of it

the editorial board hopes to stimulate the development of the social sciences, which are being justly criticized today. This criticism also applied to no small degree to philosophy. But although it is difficult to characterize unequivocally the situation that has formed in philosophical science, one should not evaluate it entirely negatively.

In the report of Ye.K. Ligachev at the All-Union Conference of Heads of Social Sciences Chairs the unquestionable importance of philosophical science was stressed and its individual achievements were pointed out. At the same time the report contained justified criticism of the situation in this science, and, of course, philosophers should not take just the first part of this evaluation. But it would be incorrect not to see what has been done: this would mean, apart from all else, to substantially undermine the effect that our philosophical research has on the development of science both in our country and throughout the world.

I would not say that many such works, which merit a high rating, have been completed here. But, on the other hand, why should there be many of them? If we try to analyze the very essence of philosophy, this question will not seem idle. In fact, in several branches of philosophy one, two, or three works are sufficient to fully justify the existence of all philosophical institutions.

In philosophy, perhaps, to an even greater degree than in other sciences, written works are "piece goods." Their level is strongly dependent on the talent of the researcher. And it is not at all frequently suggested that there should be a "front of research," as it is sometimes called. There are institutes and there is the department, but their existence, so it seems, is justified only by the fact that they create a general background, only on which the appearance of talented, strong works is possible. And there should not necessarily be many such works. Here the orientation toward the "gross" is also entirely inappropriate.

It is possible to cite one example. Philosophers are now being criticized for the fact that too few works on the sociophilosophical problems of the scientific and technical revolution are being published. Indeed, the analysis of the achievements of the scientific and technical revolution is connected with the development of electronics, automation, and robotics. And here many philosophical problems relating the place of a man in society and the meaning of the activity and life of man are arising.

We have few works on this level, but they do exist, and it is impossible not to direct attention to them, to say nothing of the fact that in general the statement of the problem of the scientific and technical revolution as such came from philosophers, this very term was invented by the philosopher John Bernal. These ideas were embraced and began to be developed in our philosophical science. That this development had little effect on practice is another matter: practice itself was indifferent to this problem, there was no need to interpret it, which M.S. Gorbachev spoke about at the conference of heads social sciences chairs. As a result this field was "nonprestigious." The people who dealt with it were slighted. If a work did not contain the words "developed socialism," the theme was viewed as something secondary. We must bear all this in mind.

In the 1960's and 1970's philosophers sensed an influx of creative forces, new young forces (young at that time), which began developing work along a broad front, particularly in the field that we call the philosophy of natural science, appeared. These new philosophers took the trouble for a number of years and decades to study the present state of the natural sciences and to establish productive contacts with nature scientists--among those seated in the hall there is probably literally not one scientist who did not take part in the work on the philosophical questions of the nature sciences. But this required great efforts.

It is another thing that in recent years the attitude toward this research has begun to change again, in some works they are viewed as something secondary. In some printed publications and oral speeches it has been directly stated that it is necessary to reduce the number of hours devoted to studying the philosophical bases of natural sciences.

The same break of philosophical studies of science from practice, which we faced in the middle and at the end of the 1950's, has emerged again.

But what nevertheless was done from the beginning of the 1960's to the middle of the 1970's?

With the participation of prominent scientists, such as P.L. Kapitsa and others, a number of very important problems were posed, including philosophical problems of human genetics, man and his habitat, education and training, sociophilosophical problems of demography, and others. We began thinking about the humanistic "measurement" of science, its connection with humanistic values and ideals, and the global problems of the present. And when we read today about global problems in general literature and party documents, we must not forget how much blood this cost the scientists who substantiated development of this direction of research.

And, finally, the problems of man. Our philosophers defended the necessity of their statement and comprehensive study for many years.

It seems that the problems of philosophy now demand a careful scientific analysis that would make it possible to make a comprehensive, objective judgment about what has been and what needs to be done further.

We are now preparing intensively for the 8th International Congress on the Logic, Methodology, and Philosophy of Science. The very fact that the International Union of the History and Philosophy of Science selected our country's capital to organize this congress testifies to the great prestige of the works of our scientists on these problems, moreover, not only philosophers but also mathematicians, logicians, and physicists. Sections on mathematical logic and on the foundations of such sciences as physics and biology will work at the congress. Our works in these directions, perhaps, are not "epoch-making," but they are at the world level. And we can present much of what we are doing to the meeting of the world scientific community.

The same can be said about works on global problems. Our specialists are now taking part in a plan to create a new public organization--the Ecoforum for Peace. We are participating in the scientific programs of the International Life Institute, which is preparing the comprehensive program "Science in the Service of Humanity: Global Problems." After the well-known responses of M.S. Gorbachev and R. Reagan to the letter of this institute's director M. Mareaux Soviet and American scientists began to work jointly on this program. Both A.P. Aleksandrov and other members of the Presidium of the USSR Academy of Sciences have very actively supported the development of works on the philosophy of science and have spoken at all-union conferences on these topics. But today research on the logic, methodology, and philosophy of science demands some new stimuli, it should also, apparently, be more widely developed in the system of the Academy of Sciences, and it is also necessary to devote more attention to them on the part of the Presidium.

When he was still the director of the Siberian Department of the USSR Academy of Sciences, G.I. Marchuk devoted a great deal of attention to these questions, and for this reason we have no doubt that such work will be expanded now that he has become our academy's president.

In conclusion it is necessary to speak about another aspect of the cooperation between philosophy and the natural sciences. Today philosophers, who were previously accused for the fact that they hampered and criticized first genetics, then cybernetics, at times themselves have to take the defense, defend themselves against naturalists, and prove the correctness of the statement, for example, of the problem of man as an independent complex scientific problem. Philosophers are actively supporting the necessity of studying problems of human biology, the development of human ecology, and so on, and of establishing the corresponding institute in our country at the academy. Meanwhile because of this we are now being accused of biologization, of the fact that we are exaggerating the role of the biological component, and so on, and this is being enveloped in the same forms that the once severely criticized philosophers used. Why should naturalists do this? And this is very often done unskillfully.

One cannot but agree with Academician V.L. Ginzburg: we need to democratize our life even more. Under the conditions of the development of democracy, creativity, and initiative, under the conditions of complete openness, truth, and information our philosophers will do everything to satisfy the requirements of the tasks which are now being set for us by our party.

Academician I.M. Gelfand

I was pleased by the mention in the speech of Ye.K. Ligachev that serious attention will be given to questions of mathematics. This is also important for the reasons.

Figuratively speaking, mathematics is a kind of iceberg. Applied mathematics is its visible part, and pure mathematics, the content of which it is hard to explain to laymen, is its submerged part. But if this part is taken away, the entire iceberg will sink.

The connection between pure and applied mathematics in Russia and the Soviet Union has always been on the highest level. It is enough to mention A.N. Kolmogorov, whose works on pure mathematics are classic. Of his many works that provide the basis for many directions of applied mathematics, one can mention one of his comparatively new works, which is devoted to the concept of complexity. It is one of the basic ones in information science. An international journal, which is called COMPLEXITY and is devoted to different aspects of this concept, is published abroad. The traditions of the inseparability of pure and applied mathematics, which go back to L. Euler and P.L. Chebyshev, were developed in Soviet times by M.A. Lavrentyev, M.V. Keldysh, and L.V. Kantorovich and are now being continued by N.N. Bogolyubov, S.L. Sobolev, and other prominent scientists, in whose works both pure and applied mathematics occupy a large place.

Unfortunately, this submerged part of the iceberg has recently decreased somewhat. Perhaps, not everyone yet senses this today, but there is a serious danger here, which, if appropriate steps are not taken, will inevitably appear in 5-10 years. Therefore, the basic task now is to raise the fundamental level of mathematics. Incidentally, it is possible to group with the great services of the Academy of Sciences the fact that at one time it formulated the term "fundamental directions" and raised their significance.

Why is the decrease of the level of mathematics occurring? Evidently it is connected with the trend toward the formalization and bureaucratization of the approach to scientific work. The people employed in science could be divided into three categories: persons who are talented and work successfully, but are often helpless organizationally; organizationally talented people, who have a good sense of new ideas and are capable of developing them; such people are very much needed. There is also a category of people, who lack the first two qualities, but have worldly talent to occupy a leading position in science. Such people, whom I would call "go-getting," are encountered fairly often.

The entire educational process in our country is proceeding outwardly well. The number of D students in school is not increasing and is even decreasing slightly. The number of those successfully completing the mathematics faculty of universities has remained at a stable level. The defense of candidate dissertations is progressing "normally." The number of doctors of sciences is not decreasing. As has been said here, the composition of scientists personnel might be rejuvenated or might not, but who is to judge? It is necessary to select councils that approach the questions of defending a dissertation scientifically and honestly.

I would also like to note that the scientific level of the Mathematics and Mechanics Faculty of Moscow State University--one of the most prominent world mathematics centers--has recently decreased. All world experience shows that it is easy to lose, but very difficult to revive scientific traditions. It is now not yet too late to restore this level.

Finally, about information science. It should be expected that works on information science will constitute one of key directions. When motor vehicles, which dukes and princes drove, appeared, no one yet understood that

motoring would change the concepts of distance and time. In exactly the same we cannot entirely evaluate the change in human culture that the mass use of personal computers will cause (there will soon be millions of them). Therefore, it is necessary to group information science with the basic, but not yet established sciences and it is absolutely necessary to develop it. Of course, this is not so simple. I happened to have a conversation with the prominent American scientist Bitsy from the Massachusetts Institute of Technology, where N. Wiener worked and developed cybernetics. Bitsy obtained money for organizing a new faculty, which will deal with the problems the perception and study of motion and with how it is possible to use these questions of neurophysiology in developing robots. I asked him point blank: "What will you do there?" He answered: "For the present I do not know. I want to get talented people and jointly look into what to do." "And did you find many such people?" "Oh yes. In 2 months I found five people, this is not that few."

In our information science there is an interesting reserve, moreover, in different directions (this is important because the science has not yet become established). It includes the work of G.I. Marchuk jointly with biologists on mathematical models of immunity and A.P. Yershov's work on general concepts of information science. Very interesting research is being done on computer-aided design systems at the Moscow Motor Vehicle Works imeni I.A. Likhachev. I would also like to mention one problem that we worked on for 10 years and that would not have been solved without initial informative ideas. It pertains to the field of medicine.

In Moscow alone it is necessary to examine several million photofluorograms. It is difficult for X-ray technicians to do this by hand. The task was to develop a recognizing device that would select from the X-ray pictures the suspicion of an oncological disease. We developed the corresponding set of programs that accomplishes this task, which the Americans have been unable to do, and now the immediate problem is to create corresponding hardware.

Academician N.P. Bekhtereva

At present it is very important that with respect to research on a wide range of problems, which it is possible to unite by the concept "the human factor," the USSR Academy of Sciences would retain a leading role and would not "forget" this most serious aspect of scientific research. There are many problems in this field, a large part of them are based on fundamental developments.

Today I will dwell on a few of them. In the area of the study of the human brain in our country significant gains have been made not only in basic research, but also in introducing its results into medical practice and the pedagogical process. Research results have also made it possible to picture what is happening with the human brain in the present period of history--the period of the arms race--to generalize these data and to submit them to the verdict of the international community in two basic forms: an examination of the physiological bases of the psychological consequences of the arms race and participation in the so-called "Declaration on Violence," which was drawn up on the initiative of progressive scientists--biologists, medical personnel,

sociologists, psychologists, and other specialists. The essence of this declaration lies in the scientific refutation of the existing notions of the inevitability of violence and its most serious manifestation--war between nations. Now everything possible is being done for the adoption of this declaration as an official international document.

Basic research on the human brain was faced with the difficulties of studying the physiological and biochemical bases of its activity. It became possible to overcome them thanks to the development of positron emission tomography [PET]. It is necessary to produce not more than 20-30 such instruments for our country--they make it possible to obtain new material about the brain's operation both in ill and healthy people. This equipment is constantly being improved abroad, while in our country it is absent.

It is very important that the Leningrad Information Science and Automation Institute of the USSR Academy of Sciences, where this research is now being conducted, would become the main institution for these problems. We are also asking for the support of the USSR Academy of Sciences in solving this problem.

The second question pertains to fundamental developments in the field of human mental health. The USSR Academy of Medical Sciences and its president displayed initiative in establishing the Mental Health Center. It is assumed that not only will this center be a treatment institution, but basic scientific research will also be conducted at it. And in this respect much is now being done, but this is far from enough. Capital investments in the study of the healthy and diseased human brain are continually being increased abroad. New principles and methods of diagnosing brain diseases are being developed and the mechanisms, which are the basis for mental disorders, are being discovered. We cannot lag behind the world level any longer! The creative of a material base, the development of basic research, and the concentration and coordination of the efforts of highly skilled specialists of the biological type, who work in the system of the Academy of Sciences, are necessary for this. It is necessary to take the path of the quickest development of our own domestic instruments for priority developments, which will correspond to the world level and, perhaps, surpass it.

It must be realized that the Academy of Medical Sciences cannot cope with this alone, even having established the mentioned base institutions. The Scientific Council for the Comprehensive Study of Human Problems has been created at the USSR Academy of Sciences, and it would be a good thing if it focused attention on basic research in the field of human mental health. The mental health of the population is an issue of vital state importance.

Academician N.M. Zhavoronkov, academician secretary of the Physical Chemistry and Technology of Inorganic Materials Department

Scientific and technical progress is governed by the interrelated processes of the discovery and use of new energy resources, the development of new, more advanced tools of labor and production methods, which ensure higher labor productivity, and the development and use of new materials.

It is well known that in recent times great interest in industrially developed countries, especially the United States and Japan, has been displayed in such a material as construction ceramics. This work is also being performed in our country, but it is developing too slowly. In 1984 the Academy of Sciences jointly with five ministries and representatives of the State Planning Committee formulated the Keramika Program. And for more than 2 years it has been discussed and studied, but so far has not become a "guide to action."

Such an attitude to such important work is intolerable. It is perhaps sufficient to cite only one fact to explain this. Not only purely ceramic materials based on nitrides, carbides, and oxides of group II and III elements of D.I. Mendeleev's periodic table, but also composites, that is, ones reinforced with ultrastrong fibers that give the material a high impact strength, are now being developed and produced. In 1985 Japan exported to the United States silicon carbide fibers, which are used together with other high-strength fibers for reinforcing ceramics. In our country this fiber is being produced on a pilot industrial scale.

In order to successfully conduct work on developing new materials it is necessary to study the diverse dependences of their properties on their internal structure. The appropriate instruments and the latest research equipment are needed. Without it is impossible to penetrate inside the atomic structure of matter. Up until now the instrument making industry in the USSR has lagged behind the needs of science and practice. It is absolutely necessary to ensure the proper level of instrument making for the successful development of material science.

One characteristic feature of scientific progress is that the majority of major problems of modern science are complex, their solution is beyond individual scientists and frequently requires not only large collectives of specialists from different fields of knowledge, but also the uniting together with scientific organizations also of planning and design and production organizations. Enormous changes have also taken place in industry in recent decades. At present few plants of narrow specialization are being built. In most cases these are combines with the production of many products and the use of diverse technological processes. On this level as well cooperation between science and industry is acquiring new aspects. In 1985 the Physical Chemistry and Technology of Inorganic Materials Department held a scientific session at the Lipetsk Metallurgical Combine. It must be stressed that this was of interest to both the workers at the plant itself and scientists of the department; the session became a sort of university.

The Lipetsk Combine is a huge, advanced metallurgical complex with more than 48,000 workers, which makes pig iron, steel, and rolled sheet products, has a byproduct coke works, and produces synthetic ammonia based on the hydrogen of coke gas with the obtaining of mineral fertilizers. The combine has virtually no waste products. Blast furnace slag, which, as a rule, forms mountains of dumps at many other plants, is completely processed here. It is granulated and used as a filler material for concrete in road construction and in part in cement production. At the plant there is even a large shop for raising fish with the use of the waste of low-potential heat.



A number of questions of the development of ferrous metallurgy, which became the basis of a plan of scientific and technical cooperation between the Academy of Sciences and the USSR Ministry of Ferrous Metallurgy, which was then discussed at a joint meeting of the collegium of this ministry and the academy's Presidium, were considered at this session. After the 27th congress additional corrections were made in the plan, it has now been signed by the minister and president of the Academy of Sciences and serves as the basis for work on accelerating scientific and technical progress in the sector.

A few words about the higher school. Highly educated specialists with a broad outlook are needed to manage large modern scientific institutions and industrial enterprises and their subdivisions. Lomonosovs and Mendeleyevs, Kurchatovs, Keldyshes, and Korolevs are needed. The possibility of their appearance in connection with the extensive development of higher education and the development of culture is increasing. It is necessary to increase the attention to their identification and education. However, the increase in the number of narrow specializations at higher educational institutions, which occurred for many years, did not promote this. Suffice it to say that the number of specialties, in which engineers are trained, in our country is tenfold greater than in the United States. The intensification of the general science, general technical, and economic training of specialists in broader specialties and the selection of those most capable of scientific, engineering, and design activity are one of the most important tasks of our higher school today.

I would also like to return once again to one urgent problem of great national economic significance--the efficient use of raw material resources for aluminum production. A strong aluminum industry has been created in the country. But the reserves of bauxites, the main raw material for aluminum production, are limited both in the USSR and in the world as a whole. At the same time in our country there is another aluminum raw material. First of all this is the apatite and nepheline ores of the Kola Peninsula. At present only apatite is being extracted from them, but over half a billion tons of nepheline tailings have accumulated in dumps. Meanwhile it is possible to obtain from this nepheline alumina, the cost of which is half as great as the average sectorial cost of alumina in nonferrous metallurgy. Moreover, here it is possible to obtain a large number of other products that are needed by the national economy--calcined soda, potash, cement. The corresponding technological process has been developed, three plants have been built, but this has not undergone further development: departmental barriers are interfering, since the process as a whole does not "blend" with a single sector.

The Geology Institute of the Siberian Department of the USSR Academy of Sciences has made a very promising discovery--a new source of raw material for aluminum, so-called synnyrites, which occur in the Northern Transbaykal region, moreover, in the vicinity of the Baykal-Amur Railway Line, has been discovered; they contain 18-20 percent potassium oxide, and, consequently, from them along with aluminum it is also possible to obtain potash. And potash is a very valuable product, particularly an ideal fertilizer for potatoes, which are one of the main sources of potassium for man. The use of

potash ensures a much longer storage time of harvested potatoes than potassium chloride, which is presently used everywhere.

The further development of the raw material base of the aluminum industry needs to be oriented toward the complete use of the Kola nepheline wastes during apatite production. Incidentally, these wastes contain a significant quantity of titanium dioxide in the form of the minerals titanium magnetite and sphene. Their use would help solve the problem of providing the country with titanium dioxide white pigment for producing white paints in the paint and varnish industry. At the same time it is necessary to speed up scientific and pilot industrial research on using Northern Transbaykal synnyrites.

Academician L.M. Brekhovskikh, academician secretary of the Oceanology, Atmospheric Physics, and Geography Department

A certain relaxation of the attention to the basic sciences is causing me and many of my colleagues much anxiety. If I.M. Gelfand's figurative comparison--of mathematics with an iceberg--is applied to all science, then basic science is the submerged portion of the iceberg, while applied science is the portion above water, and it is a bad thing if the lower part thaws and shrinks.

Very much attention, including in the Presidium of the USSR Academy of Sciences, has recently been devoted to interbranch scientific technical complexes. It is, of course, necessary to create such complexes, but, I am afraid, they will not attain their goal. It is difficult for them to make a series-produced product, and when their developments pass into industry, it will make this product in its own way anyway. Often industry is not interested in new inventions. Here lies the root of our difficulties, this is what must be changed first of all. A colleague of mine from Odessa told me that they developed a device to increase the effectiveness of fish seeking equipment. They offered it to the fishing industry. There they said: for God's sake do not give it to us. It will not give us anything, except an increase of the plan of the catch, which then will be sent out from above.

Academician Zh.I. Alferov is right that we should train personnel for industry. But if they have to be "introduced" in the same way as inventions, this will be quite bad. Introduction always involves pressure. In accordance with the basic laws of mechanics, pressure causes counterpressure, and the result is not great. Work with industry will progress normally when the term "introduction" loses its meaning and is replaced by "the transfer of results." Perhaps industry's transition to cost accounting will promote this.

The development of the basic sciences is the main task of the Academy of Sciences. Here very effective forms of cooperation with industry are not eliminated. The work of many organizations in the framework of the interdepartmental comprehensive program "World Ocean," in whose formulation A.P. Aleksandrov and G.I. Marchuk took part, can serve as an example.

Another urgent problem is the strengthening of the research base of institutes, especially natural history themes. Many institutes of the Earth Sciences Section are literally in a catastrophic situation. The Geography Institute of the USSR Academy of Sciences, the Water Problems Institute of the

USSR Academy of Sciences, and a number of other institutes do not have facilities that are suited for work. It somehow turned out that in our country, as, incidentally, abroad, fewer assets are being spent on the natural history sciences than on the sciences that advance technology. As a result we easily dig canals thousands of kilometers long, but cannot calculate or understand what influence this will have on nature. Soviet automatic stations have been to other planets, but we cannot give an accurate weather forecast for tomorrow. It can be said that powerful computers are needed for a forecast, but nothing will come of any work with modern computer technology, if the elementary physical phenomena, which occur in the environment, are not understood.

A few words about Academician G.I. Petrov's speech. The Water Problems Institute worked out versions of the possibilities for diverting part of the runoff of northern rivers in accordance with the directives of the 25th and 26th CPSU Congresses. At one time the method of computations was examined and approved by Academician A.N. Kolmogorov. Its basic principles were published in the journal VODNYYE RESURSY (No 5, 1986). We will gratefully accept and discuss any constructive criticism of this method. I should add that owing precisely to the calculations of the institute it was possible at one time to reduce the projected intake of water from the northern rivers to one-half--from 10 to 5 cubic kilometers.

Finally, one more comment of an entirely different sort--about the practice of mobilizing associates for vegetable bases, agricultural operations, and so on. This practice, which has become rooted, is very bad because, first, it breeds among associated disrespect for their own working time and, second, the poor organization of these operations has a demoralizing effect on a person. Furthermore, as a result the directors of the bases and kolkhozes do not get any stimulus for developing another, more efficient system of work.

Academician V.A. Vinogradov

Serious and just criticism of the situation, which has formed in the social sciences, and their lack of contact with the accomplishment of important economic tasks and the solution of pressing social problems is contained in the documents of the 27th CPSU Congress and in the decree of the CPSU Central Committee "On the Journal KOMMUNIST." At the same time these documents contain a broad multidimensional program of the development of the social sciences. M.S. Gorbachev turned to these questions once again in his speech to the All-Union Conference of Heads of Social Sciences Chairs of Higher Educational Institutions of the Country. M.S. Gorbachev's speech made an indelible impression on all the conference participants. The increased role of the social sciences was spoken about in a meaningful manner in the speech of Ye.K. Ligachev at this session of the General Assembly of the USSR Academy of Sciences.

The social sciences are called upon to make their contribution to scientific and technical progress, but for this in addition to other steps it is necessary that technical progress would also completely encompass the organization of the work of social scientists themselves. The acceleration of theoretical and practical developments in the social sciences depends in many

respects on the equipment of social science institutes with computers, personal computers with good software, peripherals for them, and other advanced technical tools, which increase labor productivity. The institutions of the Social Sciences Section presently have only single examples of such equipment. The presence of a modern complex of rapid printing and copying equipment is an important means of accelerating developments and introducing them in practice. The effectiveness of research results depends on the speed with which they are compiled, published, or copied. The preparation of manuscripts on floppy disks of personal computers is becoming practicable--this makes it possible to reduce publication time many times over. Naturally, electronic printers with a rich set of diverse type faces and high printing quality are needed here. This also concerns the Science Publishing House--the existing printing base can no longer satisfy us.

A complicated situation has arisen in the Academy of Sciences with respect to copying equipment. The USSR State Planning Committee forbid the use of the foreign currency allocations, which were allotted specially to by the Academy of Sciences in 1985, to acquire copying equipment, even though the same State Planning Committee purchases xerox machines for its own needs. They also refused the request of the academy to purchase xerox machines in 1986.

The presence of modern information systems and networks is an indispensable condition of the increase of work efficiency. Much has been done in this direction in the Social Sciences Section: an information network of social sciences and humanities institutions of Moscow, the union republics, regional scientific centers, and scientific centers of the socialist countries is being developed based on the Institute of Scientific Information on the Social Sciences of the USSR Academy of Sciences. The databases of the Institute of Scientific Information on the Social Sciences currently have more than 400,000 documents, and they are being used actively--there are 1,400 collective and individual users. The result is not bad. However, we are also experiencing great difficulties here, and again for technical reasons: the unreliability of 100-megabyte disk units is having an effect. And this is not only our problem--on account of these disks many computer centers of the country are using their capacities ineffectively.

We dream about reliable 100-megabyte magnetic disks, but this is the past of information science! Today all information centers abroad are switching to new technology using laser optical disks and video disks. Soviet scientists first of all received the Nobel Prize for discovering lasers. We are proud this. Apparently, Soviet lasers are no worse than foreign ones. So why are we so far behind in the matter of creating optical disks and quickly setting up their production?

The Institute of Scientific Information on the Social Sciences is now ready to become the main base organization for disseminating advanced know-how in matters of creating automated information systems and networks in the social sciences and introducing personal computers into the practice of scientific work. The institute is to a certain degree already performing these functions. A special room, in which 12 displays have been installed, has been set up for scientists--they both study and work at them. A educational center with personal computers is being opened. It still only has 12 personal

computers, but by the end of 1986 there will be twofold more. This is not a bad beginning, but it is only a beginning. At the institute there are the appropriate specialists and advanced network information technology and work experience has been gained. Further help of the Presidium of the USSR Academy of Sciences in developing the technical base is needed. We accepted with great satisfaction Ye.K. Ligachev's words that the technical equipment of the institutions of the Academy of Sciences will be continually advanced.

In scientific work a large role belongs to the book and the journal article as a source of information. The comprehensive nature of the development of the social sciences, the necessity of the extensive coverage of domestic and foreign publications, and the promptness of their receipt--all these are questions of vital importance. It should be said that neither the quantity nor the time of receipt of foreign literature satisfies the demands of representatives of all directions of the social sciences. The Academy of Sciences allotted 10 percent of the special-purpose allocations in 1974 for these purposes, while we received only about 8 percent for 1986. As a result in 1986, with allowance made for the increase of book prices, one-half as many of them will be purchased.

A few words about the path which books cover from European publishing houses to the Institute of Scientific Information on the Social Sciences. The path timewise takes, as a rule, about 3 months. Such a time of delivery of information sources complicates the conducting of aggressive counterpropaganda and rapid information about the socioeconomic and ideological processes occurring in Western society. What is going on here? There is something for somebody to think about. I hope this will be done.

I will dwell on another question that is causing alarm. It is a matter of the unfavorable situation that has formed in many republic academic centers of information on the social sciences as a result of the improper attitude toward the needs of social scientists (including of the information services in this area), which once again existed for years. It is time to place the questions connected with developing republic and regional services of information on the social sciences among the priority questions.

Indeed, is it possible to regard as normal that in the majority of cases the republic organs of information on the social sciences, which were formed after the establishment of the Institute of Scientific Information on the Social Sciences, are dragging out an unenviable existence, the disparity in their structure and subordination remains, to this day there is no model statute, which specifies their status as independent institutions, their material and technical base is extremely weak, and they are experiencing an acute shortage of personnel and facilities? Many directors of republic centers spoke about this with bitterness at the 5th All-Union Seminar of Management Personnel of of Centers of Information on the Social Sciences, which was held in Riga on 9-11 October 1986. I will cite two examples: the staff of the information department of the Lithuanian SSR Academy of Sciences was cut by 30 percent in 5 years; eight information centers of the republic academies, which work via telephone communications channels with databases of the Institute of Scientific Information on the Social Sciences, were equipped with its direct participation. Not receiving the necessary equipment from their own

academies, our colleagues from the republics turned directly to the Institute of Scientific Information on the Social Sciences, and we shared with them terminals, modems, and printers, which were obtained with difficulty.

A paradoxical situation has formed: in the country there are 228 central information organs and tens of territorial centers in the field of the natural sciences and technology. They all have the status of independent institutions. In the sphere of information on the social sciences there is only one independent scientific institution in the Academy of Sciences--the Institute of Scientific Information on the Social Sciences of the USSR Academy of Sciences. All our attempts to change the situation did not yield results.

Is all this really normal? We have asked these questions many times and at different levels. One would like to believe that after the 27th CPSU Congress and after a number of directives of M.S. Gorbachev on the important role of the social sciences the attitude toward the needs of social scientists at the Academy of Sciences and beyond it will change. This General Assembly is reassuring in this respect.

The development of information activity in the field of the social sciences is a promising matter that has been called upon among other factors to ensure the acceleration scientific developments, the reorganization of Soviet social science, and its link with practice. Hence the attitude toward this direction should also be appropriate.

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## CLOSING SPEECH OF MARCHUK AT GENERAL ASSEMBLY

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 80-82

[Speech by President of the USSR Academy of Sciences G.I. Marchuk at the General Assembly of the USSR Academy of Sciences in Moscow under the rubric "The Session of the General Assembly of the USSR Academy of Sciences": The Closing Speech of President of the USSR Academy of Sciences Academician G.I. Marchuk"]

[Text] The results of this General Assembly, Academician V.A. Kotelnikov's report, and the meaningful statements of many academy members testify that the turn, for which the party is appealing, has already begun in our work.

We have submitted to this General Assembly many major, vitally important problems which should be solved in connection with the posing of new tasks. The number of purely professional, although, perhaps, urgent questions have decreased in the statements. Evidently, for their discussion it is necessary to meet more often in the departments, in the sections, and at the meetings of the Presidium. While questions of a general nature, for example, the effect of the results of research at the Academy of Sciences on the national economy and the specification of ways of developing the basic sciences themselves and integrating them should be formulated and examined with great attention at the General Assemblies. That such a necessity this has been realized and expressed in the speeches testifies to the maturity of the collective of the academy and the understanding and support of the decisions made at the 27th CPSU Congress.

In essence the congress marked a new period in the development of Soviet society. It took place in an atmosphere of adherence to party principles, exactitude, the open revelation of shortcomings and omissions, and the thorough analysis of the internal and external conditions of the development of our society. At this General Assembly much has been said about precisely those problems that were posed at the April (1985) CPSU Central Committee Plenum and at the 27th party congress, particularly about openness, democratism, and the problems of increasing the effectiveness of the labor of scientists. The discussion at the General Assembly turned out to be useful, and changes in the life the academy have emerged. It is important to consolidate these changes in order to ensure the fulfillment of our new tasks and to implement the constructive suggestions heard here.

In his speech Comrade Ligachev shed light on a number of problems that the Academy of Sciences must solve by 1990. And starting with today's assembly it is necessary to think about what the role of the academy at this new stage of its development should be and to look for new approaches and solutions.

The reorganization of the work of the Academy of Sciences has already begun, but it is not proceeding intensively enough. This has already been spoken about here. The most important directions of reorganization were characterized in Ye.K. Ligachev's speech.

The Presidium of the USSR Academy of Sciences is turning to all the academy members with the appeal: everyone should take part in this work, without waiting until some subdivision or some group begins to prepare proposals on the further development of the Academy of Sciences and the assurance of its influence on scientific and technical progress. No matter how many proposals there are, they will be examined, up to the most important ones--so long as it is clear that their implementation can help to work in the way that was outlined by the 27th CPSU Congress.

The regional departments, affiliates, and primary scientific subdivisions need increased attention from us. It is necessary to increase both their rights and their responsibility, as well as to achieve an increase of the success rate of their work. The departments of the USSR Academy of Sciences should be transformed into headquarters that specify the scientific priorities and directions of scientific research of the country's academic institutes.

It is necessary to revise the thematic plans of the institutes. Examples of the unfounded lengthening of the time of the work of institutes on selected themes, which sometimes last for more than 5 years, were cited in V.A. Kotelnikov's report. It is necessary to make our plans more dynamic, taking into account in them the new organizational forms that the Presidium plans to introduce, in order to get rid of the traditionally established restrictions and obstacles in the work of the departments, institutes, and other institutions of the Academy of Sciences.

It is necessary to discuss the results of the work of the conference of directors of social sciences chairs. Our social sciences scientific institutions, and first of all those of the economic type, should in a short time outline an entire set of measures, formulate the corresponding proposals, and turn them over to the Presidium in order to submit them for the consideration of the government.

The status of scientific personnel at the academy is a serious issue. As was stated in V.A. Kotelnikov's report, an aging of all categories of scientific associates is being noticed. It is necessary to ensure an increased influx to the USSR Academy of Sciences of talented young sciences and the outflow of people who do not satisfy the great demands on academic workers.

It should be admitted that the conducted certification of scientists so far has not proved to be effective, and here, apparently, the management of scientific institutions, which did not approach certification with sufficient



exactitude and used this opportunity poorly for improving the work with personnel, is in many respect to blame. It is also necessary to approach in earnest question of training personnel through academic of graduate studies and to carefully examine once again how this work is being performed.

As was noted in the speeches, one shortcoming in the work of the USSR Academy of Sciences is a certain closed nature. The link with the higher school and with sectorial institutions is weak, although a change has emerged here. It is necessary to broaden the contacts of basic research at academic institutes and higher educational institutions, linking it more closely in so doing with the process of training scientific personnel.

It is also necessary to strengthen the cooperation with the academies of sciences of the union republics. It must be said that much has been done for the republic academies, but in a number of cases their scientific output is insufficient. Of course, there are splendid examples of work of the republic academies--the Ukrainian, Belorussian, and a number of others, but there are also those whose efficiency of work is low. And when thinking about the future of the Academy of Sciences, it is necessary to bear the entire system of academic organizations in mind, including those in the union republics. It is necessary to support them and to give help where the proper level of research has not yet been achieved, some new organization steps are perhaps necessary.

The work of the Presidium of the USSR Academy of Sciences needs to be seriously reorganized. Some speakers correctly pointed out that the number of scientific reports on individual problems, which are heard at the Presidium meetings, must be reduced. More attention should to be devoted to the work of the departments, and for this purpose the reports of the departments, institutes, and problem scientific councils should be discussed. It is also necessary to discuss constructively and critically the organizational aspects of the activity of the Academy of Sciences. This has already been spoken about in a number of speeches, and these were questions which were posed in great earnest.

The question of the most extensive introduction in practice of thematic, special-purpose meetings of the Academy of Sciences on major problems--with good preparation and a plan of actions and specific measures--should be considered. This has been done in several important directions, but the range of problems, in which our science should take a leading place in the world, is very broad. The structure of both the General Assemblies of the academy and the General Assemblies of the departments must be revised from this standpoint.

The Presidium of the USSR Academy of Sciences should consistently pursue the collective principle of decision making. This was also heard in a number of speeches from one perspective or another. Many decisions, which have been made without taking common interests into account, at times caused difficulties in work. The Presidium has overcome these difficulties.

It is necessary to improve significantly the work of the staff of the Presidium. This is the underlying basis of our organization, and it will be

necessary to deal with this question without delay. A system of rapid, efficient reaction to everything that goes on in the Presidium and the other organs, which execute the decisions of the General Assembly, needs to be established.

The shift that has appeared in the direction of the greater democratization of academy life is gratifying. A number of rather bold and at the same time constructive critical speeches have been heard at this assembly. We must not fear criticism. Polemic exaggerations are also possible in it, but this is not terrifying. It is important that the voiced critical comments have already helped note a number of questions which it is now necessary to settle in practice. And, undoubtedly, we should be very grateful to those who make, both orally and in writing, specific proposals on improving the work of the Academy of Sciences and its Presidium.

This also concerns the draft of the decree of this General Assembly. It will be submitted to all academy members, and then all the received corrections and critical comments will be examined by appropriate working groups headed by leading scientists, who should be a specific deadline draft the final version of the decree.

In the coming period the Presidium of the Academy of Sciences, the departments, and all academic institutions have intense work ahead. Its success will depend not only on management, but also on all members of the academy and all its scientific collectives. Reorganization is a matter for each and everyone, and each should find here his own fitting place. Here scientists should remember that science, which is the motive force of all progressive change, is preparing a springboard for transformations and should itself be reorganized at a leading pace, more rapidly than the other spheres of social activity.

It appears that there is every reason to evaluate positively the work of our assembly and the results of the discussion of report which was given by V.A. Kotelnikov. We see all the complexity and responsibility of the tasks facing the USSR Academy of Sciences. We have all the means for their accomplishment.

Furnished with the decisions of the 27th CPSU Congress, the collective of the USSR Academy of Sciences and all Soviet scientists will make a worthy contribution to the acceleration of scientific and technical progress and the socioeconomic and spiritual development of Soviet society.

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## PRESIDENTS OF ACADEMIES OF SCIENCES OF SOCIALIST COUNTRIES MEET

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 95-98

[Article by G.A. Sherkov under the rubric "International Scientific Relations": "Meeting of Presidents of Academies of Sciences of Socialist Countries"]

[Text] The regular, 3d Conference of Presidents of the Academies of Sciences of the Socialist Countries was held in Berlin in July 1986. President of the Bulgarian Academy of Sciences Academician A. Balevski; President of the Hungarian Academy Sciences Academician I. Berend; Professor Nguyen Van Hieu, vice president of the SRV National Scientific Research Center; Professor Pham Zuy Thong, vice president of the SRV Social Sciences Committee; President of the GDR Academy of Sciences Academician W. Scheler; President of the DPRK Academy of Sciences Academician Chong Ki-chol; Vice President of the Cuban Academy of Sciences Doctor N. Toledo; President of the Mongolian Academy of Sciences Academician Ch. Tseren; President of the Polish Academy of Sciences Academician J. Kostrzewski; Chairman of the Academy of the Socialist Republic of Romania Academician R. Voinea; Professor S. Costea, scientific secretary of the Romanian Academy of Social and Political Sciences; President of the USSR Academy of Sciences Academician A.P. Aleksandrov; President of the Czechoslovak Academy of Sciences Academician J. Riman; President of the Slovak Academy of Sciences Academician V. Hajko; and, as observers, President of the Afghan Academy of Sciences Academician S. Layo and CEMA Secretary V.V. Sychev took part in its work.

Member of the SED Central Committee and Secretary of the SED Central Committee K. Hager and Chief of the Science Department of the SED Central Committee J. Hoernig were present at the conference opening.

The problems of the contact of science with production, questions of the development of information science and computer technology, as well as the problems of peace and the saving of mankind from the nuclear threat were on the conference agenda.

A report on the problems of the contact of science and production was delivered by Deputy Chairman of the GDR Council of Ministers and Minister for Science and Technology H. Weiz, who noted that the strengthening of this contact has become one of the main prerequisites of the acceleration of

scientific and technical progress and consequently the dynamic growth of production. This assumption was clearly confirmed by the decisions of the recent congresses of the Communist and Workers' Parties of the fraternal socialist countries.

The presidents of the academies of sciences, which were represented at the conference, declared their resolve to use the entire existing scientific and technical potential to promote the attainment of scientific and practical results first of all in such fields as the electronization of the national economy, integrated automation, nuclear power, new materials and technology of their production and use, and biotechnology, that is, in those fields which are of decisive importance for economic and social progress. In this connection great importance is being attached to cooperation of the academies of sciences of the socialist countries within the Comprehensive Program of Scientific and Technical Progress of the CECA Member Countries to 2000, which was adopted in Moscow at the 41st (extraordinary) meeting of the CECA session of the level of heads of governments in December 1985. Special attention will be devoted to joint research on the problems of expanding the raw material and energy base of the socialist countries.

In spite of the fact that the tasks of strengthening the contact of science and production in individual socialist countries are being accomplished by different methods, the collective experience of conducting joint work confirms that the economic contractual basis is the most effective form of this type of contacts. The development and assimilation of key technologies, which will find extensive application in practice, should be the result of the cooperation of representatives of science and production.

During the discussion of K. Weiz's report the conference participants noted that for the assurance of a higher qualitative level of basic research it is necessary to intensify joint work on forecasting the long-range directions of the development of science. This task may be accomplished by the academies of sciences in close cooperation with scientific institutions of the higher school. On this basis the presidents of the academies of sciences of the socialist countries deemed it necessary to formulate jointly a long-range program of scientific cooperation in the field of the natural sciences, that would make it possible to create the necessary scientific reserve for socioeconomic progress for the rather long-range future.

An understanding was reached to prepare for the 15th Conference of Representatives of the Academies of Sciences of the Socialist Countries (November 1987) proposals on the concentration of joint efforts of the academies on the basic directions of research, which are of mutual interest and promote national economic development, on the use of its results, and on the development of the most effective methods and forms of the organization of cooperation.

Vice President of the USSR Academy of Sciences Academician K.V. Frolov presented a report on the development of information science and computer technology as a decisive factor of the acceleration of scientific and technical progress. He noted that such fields of science as information science and computer technology are of priority, strategic significance for

the development of socialist society and, therefore, the assurance of the contribution of the academies of sciences to the development of new generations of computer systems and to integrated automation is one of the basic tasks of their cooperation. The rapid development of microelectronics and the information and communications technologies that are based on it will facilitate the rationalization of information and intellectual processes, which will lead to a significant growth of labor productivity and thereby to the acceleration of the economic and social progress of the socialist states.

The concept "New Generations of Computer Systems," which was developed and adopted by the academies of sciences of the socialist countries and proposes the shortest routes to the practical use of research results, first of all in the 10 coordinated comprehensive scientific projects, is the basis of the further development of cooperation in the area of information science and computer technology. For this purpose, it is necessary to enlist scientific institutions of industry in the activity of the 16 international base laboratories of the academies of sciences of the socialist countries in the field of information science and computer technology already at the stage of the formulation of tasks.

The conference participants posed the task with the assistance of the CEMA multilateral intergovernmental commission for computer technology to increase the efficiency of the organization of research and planning and design work in the field of information science and computer technology based on close cooperation and the division of labor.

The presidents of the academies of sciences, who took part in the work of the conference, supported the proposals on joint scientific measures on special questions of a philosophical, historical, economic, sociological, and political nature in the interests of strengthening peace and using the achievements of science for the good of all nations. It was noted that more active and coordinated international cooperation is needed in this area, in connection with which the decision of the 7th Conference of Vice Presidents for the Social Sciences of the Academies of Sciences of the Socialist Countries to form the problem commission "Problems of Peace and Disarmament" in the framework of a system of multilateral cooperation was supported, having stressed their readiness for a dialog on these questions with all peace-loving scientific forces and movements.

The conference participants unanimously adopted the "Appeal to Scientists of the Entire World," in which they described the preservation and securing of peace as the most important problem of modern times and declared that scientists, who can foresee the catastrophic consequences of nuclear war better than many others, should realize their responsibility for the fate of humankind and be in the first ranks of the champions of disarmament and the lasting peace and security of nations. Serious anxiety over the international situation is expressed in the appeal. The arms race, which is being steadily kindled by the imperialist forces, is reaching a critical limit beyond which the situation threatens to get out of control, and is fraught with danger for the very existence of humankind. The threat of nuclear war can be eliminated only by effective methods on arms limitation and disarmament, the banning of

the militarization of space, and the consistent implementation of the Final Act of the Helsinki Conference on Security and Cooperation in Europe.

The broad disarmament program, which was submitted by the Soviet Union and envisaged the elimination of nuclear weapons by the end of this century, found unanimous approval in the appeal. The program affords prospects for freeing the world from means of mass destruction and conventional weapons, which are not inferior to them in destructive force, is aimed at the cooperation of states, and not confrontation, and affords science the opportunity to work exclusively for the good of people. It is a vivid expression of the new political thinking that is objectively required in the nuclear age and is an example of the active and responsible actions of the political leadership.

The conference participants were given the opportunity to become acquainted with the Carl Zeiss Jena, Robotron, and Umformtechnik production combines and the organization of their relations with the scientific institutions of the GDR Academy of Sciences and the higher school.

The leaders of the delegations which participated in the conference were received by E. Honecker, general secretary of the SED Central Committee and chairman of the GDR Council of State. There was an exchange of opinions on the role and responsibility of scientists in the matter of preserving peace on earth, the development of scientific cooperation of the academies of sciences of the socialist countries, and the importance of science in the matter of building a developed socialist society. A meeting and conversation with W. Krolikowski, SED Central Committee Politburo member and first deputy chairman of the GDR Council of Ministers, took place.

The participants in the conference, which was held in a warm, friendly, and creative atmosphere, confirmed their resolve to do everything possible for the further development and intensification of cooperation of the academies of sciences of the socialist countries and the utmost increase of the effectiveness of joint work, which corresponds completely to the decisions of the recently held congresses of the Communist and Workers' Parties of the socialist countries.

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## AWARDS AND PRIZES

### PRIZES OF USSR, HUNGARIAN ACADEMIES OF SCIENCES FOR JOINT WORKS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 141-142

[Article under the rubric "News Items and Information": "Agreement on Prizes Awarded by USSR Academy of Sciences and Hungarian Academy of Sciences for the Best Joint Works Performed as a Result of Cooperation of Both Countries"]

#### [Text] I. General Provisions

1. For the purpose of providing incentives to both academies the USSR Academy of Sciences and Hungarian Academy of Sciences are establishing joint prizes for the best results obtained during joint works in the area of the natural and social sciences, which are of great significance for science and practice.

2. Prizes will be awarded, as a rule, once every 3 years.

3. Three prizes, each in the amount of 1,500 rubles in Soviet currency and 30,000 forints in Hungarian currency, are being established.

Each academy pays the prize to its own scientists in its national currency.

4. Prizes are awarded to the collectives of scholars, which take part in the joint work.

In all no more than eight individuals (four from each side) may be awarded a prize for each work. The numbers of scientists, who have been awarded a prize from each party, can be different.

5. The scientists, who have been awarded the prizes, receive certificates in Russian and Hungarian, which have been signed by the presidents and chief scientific secretaries of the USSR Academy of Sciences and Hungarian Academy of Sciences.

#### II. The Procedure of Awarding the Prizes.

6. Suggestions for the joint prizes are submitted 5 months before the date of awarding.

The right to nominate candidates for the prizes is given to the members of the academies, as well as to the scientific institutions of both academies, which send their suggestions to the chief scientific secretary of the Presidium of the USSR Academy of Sciences and the secretary general of the Hungarian Academy of Sciences.

7. The suggestions should include:

--a statement of justification, which contains a scientific description of the joint work, an evaluation of the results of the work, and its significance for science and practice;

--individual publications, series of publications, technical specifications, or other materials, which testify to the achieved results (in triplicate);

--information about the authors (last name, place of work and position held, a brief scientific biography, and a list of basic published works);

--the foreign partner institution and the basis of the cooperation (a work plan, and so on);

--information about the share of each author nominated for the prize.

The aforementioned suggestions are submitted with the heading "Suggestions for the Awarding of Prizes for Joint Works of the USSR Academy of Sciences and the Hungarian Academy of Sciences."

The academies inform one another about the receipt of suggestions.

8. The discussion of the works and the recommendation of candidates for the awarding of the prizes are carried out by the national sections of the Commission for Cooperation of the USSR Academy of Sciences and the Hungarian Academy of Sciences in the Natural and Technical Sciences and the Soviet-Hungarian Commission for Cooperation in the Social Sciences.

Each academy specifies independently the voting procedure and the ratio of votes when voting, which are needed by the national sections of the commissions to make decisions.

9. The national sections of the commission send the works submitted for consideration for the opinion of no fewer than two leading specialists.

10. The members of the national sections of the Commission, who are nominees for the prizes, do not have the right to participate in the review, discussion, and vote on the submitted works.

11. The chairmen of the national sections of the commission exchange the materials and necessary information on the submitted suggestions no later than 3 months before the date of awarding.



12. The suggestions of the national sections of the commissions are discussed at the meeting of the joint commissions of the USSR Academy of Sciences and the Hungarian Academy of Sciences.

13. The meetings are held no later than 2 months before the date of awarding of the prizes alternately at the USSR Academy of Sciences and the Hungarian Academy of sciences. The chairman of the receiving academy chairs the meetings of the commission.

14. The suggestions on the awarding of the prizes are sent to both academies no later than 30 days before the date of awarding. The decision is approved by the appropriate competent organs of both academies.

### III. Final Provisions

15. There are published in the organs of the press of both academies (VESTNIK AKADEMII NAUK SSSR and MAGYAR TUDOMANY):

--the agreement on the awarding of joint prizes of the USSR Academy of Sciences and the Hungarian Academy of Sciences;

--the announcement on the holding of the competition for joint works;

--information on the scientists, who have been awarded prizes, with a brief annotation about the works that were awarded the prizes.

16. The agreement has been drawn up in two copies, each in Russian and Hungarian, both texts have identical force.

The agreement takes effect after its approval by the competent organs of both academies.

The agreement was signed on 30 June 1986.

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## USSR-BULGARIAN, USSR-HUNGARIAN, USSR-POLISH PRIZES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 142-143

[Article under the rubric "News Items and Information": "Prizes of the USSR Academy of Sciences and the Bulgarian Academy of Sciences, the USSR Academy of Sciences and the Hungarian Academy of Sciences, the USSR Academy of Sciences and the Polish Academy of Sciences"]

[Text] The USSR Academy of sciences and the Bulgarian Academy of Sciences, the USSR Academy of Sciences and the Hungarian Academy of Sciences, and the USSR Academy of Sciences and the Polish Academy of Sciences announce the competition for prizes for the best joint works of Soviet and Bulgarian, Soviet and Hungarian, and Soviet and Polish scientists in the natural and social sciences, which are of great significance for science and practice and have been completed as a result of cooperation.

The awarding of the prizes to Soviet and Bulgarian scientists will be made in 1987 and will be times to coincide with the 70th anniversary of the Great October Socialist Revolution and the 43d anniversary of the Socialist Revolution in Bulgaria.

Three prizes in the amount of 1,500 rubles each (for Soviet scientists) are being awarded.

The deadline for submitting works, which are nominated for the competition, expires on 9 April 1987. Works should be sent to the USSR Academy of Sciences with the heading: "Suggestions for the Awarding of the Prize for Joint Works of the USSR Academy of Sciences and Bulgarian Academy of Sciences."

The awarding of prizes to Soviet and Hungarian scientists will be made in 1988 and will be timed to coincide with the 30th anniversary of the signing of the Agreement on Scientific Cooperation of the USSR Academy of Sciences and Hungarian Academy of Sciences.

Three prizes in the amount of 1,500 rubles each (for Soviet scientists) are being awarded.

The deadline for submitting works, which are nominated for the competition, expires on 30 April 1987. Works should be sent to the USSR Academy of

Sciences with the heading: "Suggestions for the Awarding the Prize for Joint Works of the USSR Academy of Sciences and Hungarian Academy of Sciences."

The awarding of prizes to Soviet and Polish scientists will be made in December 1987 and will be timed to coincide with the anniversary of the signing of the Agreement on Scientific Cooperation Between the USSR Academy of Sciences and Polish Academy of Sciences.

In 1987 four prizes in the amount of 1,500 rubles each (for Soviet scientists) will be awarded.

The deadline for submitting works, which are nominated in the competition, expires on 21 June 1987. Works should be sent to the USSR Academy of Sciences with the heading: "Suggestions for the Awarding of the the Prize of the USSR Academy of Sciences and Polish Academy of Sciences."

Joint works or series of works on a single theme, which were completed both by individual copperforming scientists and by collectives of scientists of the two countries are admitted to the competition. In all for each work no more than eight individuals (four from each side) can be awarded the prize. The number of scientists, who have been awarded the prize from each side, can be different.

Academicians and corresponding members and scientific institutions of both academies will have the right to nominate candidates for the prizes. The organizations or individuals, who have nominated candidates, should send a statement of justification, which includes a scientific description of the joint work and shows its significance for the development of science and practice; the published text of the joint work or series of works, joint design, and so forth (in triplicate); information about the authors (a list of basic scientific works, place of work and position held, a certificate on the share in the joint work of each author who has been nominated for the prize).

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## BIOGRAPHICAL INFORMATION

ALEKSANDR YEFIMOVICH SHEYNDLIN

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 132-133

[Article under rubric "News Items and Information": "Academician A.Ye. Sheyndlin Is a Hero of Socialist Labor"]

[Text] For great services in the development of science and the training of scientists and in connection with his 70th birthday the title of Hero of Socialist Labor with a presentation of the Order of Lenin and the Sickle and Hammer Gold Medal was conferred on Academician Aleksandr Yefimovich Sheyndlin by the Ukase of the Presidium of the USSR Supreme Soviet of 4 September 1986.

The development of an important scientific direction, which made it possible to provide the leading sectors of technology with data on the thermophysical properties of substances: molten metals, special alloys, dissociating gases, and composite and other materials, is connected with the name of A.Ye. Sheyndlin--a most prominent scientist and specialists in the field of high temperature thermal physics and long-range problems of power engineering.

The promising direction of the direct conversion of thermal energy to electric power using magnetohydrodynamic [MHD] generators, which he developed, has obtained wide renown in the USSR and abroad. As a result of the consistent and persistent formulation and implementation of a program of this research the first industrial 580-megawatt MHD power-generating unit, of which Academician A.Ye. Sheyndlin was the general designer, was developed. Under his scientific supervision the problems of the complete processing of solid organic fuel and production of synthetic liquid and gas fuels, as well as the problems of thermal stimulation of petroleum formations for the purpose of significantly increasing their petroleum recovery have been worked on in recent years.

The scientist is successfully combining much scientific activity with enormous scientific organizational work. The Institute of High Temperatures of the USSR Academy of Sciences, which he established, has become one of the leading scientific collectives in our country. A.Ye. Sheyndlin is chairman of the Scientific Council of the State Committee for Science and Technology for the Problem "The Complete Processing of Solid Fossil Fuels With the Obtaining of Synthetic Fuels," deputy academic secretary of the Physical Technical Problems

of Power Engineering Department, and editor in chief of the journal TEPLOFIZIKA VYSOKIKH TEMPERATUR.

A.Ye. Sheyndlin is distinguished by an acute sense of what is new, a breadth of scientific interests, and the depth penetration into the essence of phenomena. Possessing extensive erudition and deep knowledge, A.Ye. Sheyndlin is devoting much effort to training scientific personnel with the highest skills. Many of his pupils have become well-known scientists and prominent engineers, who are creatively solving the difficult problems of modern power engineering.

The Soviet Government has appreciated the contribution of the scientist to science and technology, having awarded him the Order of Lenin, two Orders of Labor Red Banner orders, and the Order of the Patriotic War II Degree and by having conferred on him the title of winner of the Lenin Prize and USSR State Prize.

The scientific and organizational activity of A.Ye. Sheyndlin has received wide renown abroad. He was elected an honorary academician by the Hungarian Academy of Sciences and the Academy of Sciences of Bosnia and Herzegovina sciences and honorary doctor of the Polytechnical Institute in Tampere and the university in Eindhoven.

Academician A.Ye. Sheyndlin is greeting his birthday at the peak of his creative activity and filled with energy and new plans.

The Presidium of the Academy of Sciences sent the celebrator a salutatory address, in which it wished him good health, happiness, and many years of productive work for the good of Soviet science.

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DMITRIY GEORGIYEVICH KNORRE

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 133

[Article under rubric "News Items and Information": "Academician D.G. Knorre Is 60 Years Old"]

[Text] Dmitriy Georgiyevich Knorre is a prominent Soviet scientist in the field of bioorganic chemistry and molecular biology. His scientific works, which are devoted to the study of the kinetics of complex chemical reactions and the development of methods of the directed (affine) chemical modification of proteins, nucleic acids, and their complexes, have received wide recognition in our country and abroad. His name is associated with works on the study of the mechanism of the formation of peptide bonds in aqueous solutions and phosphodiester and phosphoamide bonds in different media when condensing reagents are used. The extensive use of the nuclear magnetic resonance of  $^{31}\text{P}$  enabled him to discover a number of important intermediate compounds in the phosphorylation reactions, which are used in the synthesis of oligonucleotides and their derivatives.

In the area of affine chemical modification of biopolymers the scientist has obtained a broad set of reactive derivatives of transport ribonucleic acids and oligonucleotides, has developed a simple universal method of obtaining derivatives of nucleoside triphosphates, has developed the theoretical bases of the kinetics of affine modification by means of reagents, which form active intermediate particles, and has accomplished the directed modification of nucleic acids within the cell.

D.G. Knorre is successfully combining productive scientific activity with much educational and scientific organizational work. He is the organizer and director of the Novosibirsk Bioorganic Chemistry Institute of the Siberian Department of the USSR Academy of Sciences.

The Presidium of the USSR Academy of Sciences has sent the celebrator a salutatory address, in which it commended his scientific services and wished him good health and new creative successes for the good of Soviet science.

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VALERIY ALEKSEYEVICH LEGASOV

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 134

[Article under the rubric "News Items and Information": "Academician V.A. Legasov Is 50 Years Old"]

[Text] Valeriy Alekseyevich Legasov, winner of the Lenin and USSR State Prizes and prominent Soviet physical chemist, who works in the field of nuclear technology, has made a great contribution to the development of new methods of chemical synthesis using high fluxes of atoms and charged particles, as well as radiation fields. He synthesized and studied a number of new compounds of noble gases and other elements in abnormally high degrees of oxidation and proposed and implemented methods of their practical application.

Research and development on the use in power engineering technology of nuclear reactors, as well as research in the field of hydrogen power engineering are being developed under the supervision of V.A. Legasov.

Along with productive scientific activity V.A. Legasov is doing much scientific organizational work as a member of the Presidium of the USSR Academy of Sciences, first deputy director of the Atomic Energy Institute imeni I.V. Kurchatov, and editor in chief of the yearbook ATOMNO-ENERGETICHESKIYE PROTSESSY I TEKHNOLGYIA. Being the head of a chair of Moscow State University imeni M.V. Lomonosov, he is taking an active part in training highly skilled personnel.

The Presidium of the USSR Academy of Sciences sent the celebrator a salutatory address, in which it commended his scientific services and wished him good health and further creative successes for the good of the homeland.

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## VITALIY LAZAREVICH GINZBURG

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 134-135

[Article under rubric "News Items and Information": "Academician V.L. Ginzburg Is 70 Years Old"]

[Text] For Services in the development of physical science and the training of scientists and in connection with his 70th birthday Academician Vitaliy Lazarevich by the Ukase of the Presidium of the USSR Supreme Soviet of 3 October 1986 was awarded the Order of Labor Red Banner.

The many works of V.L. Ginzburg, a prominent Soviet theoretical physicist and winner of the Lenin and USSR State Prizes, pertain to practically all sections of physics and astronomy. He enriched plasma physics, solid-state physics, the theory of superfluidity, the theory of superconduction, radio astronomy, the theory of the origin of cosmic rays, gamma and x-ray spectroscopy, quantum field theory and the theory of elementary particles, acoustics, and thermonuclear fusion with research, which led to a deeper understanding of many processes and made it possible to predict interesting phenomena.

V.L. Ginzburg's research is widely known to physicists throughout the world. The pupils of the scientific schools, which he established, and many undergraduates and graduate students recognize the rare pedagogical talent of their teacher.

V.L. Ginzburg combines his active scientific and pedagogical work with multifaceted scientific organizational activity, heading the Theoretical Physics Department imeni I.Ye. Tamm of the Physics Institute imeni P.N. Lebedev of the USSR Academy of Sciences and a chair of the Moscow Physical Technical Institute. Active work in the bureau of the General Physics and Astronomy Department, supervision of the monthly joint scientific sessions of two departments and the Moscow-wide seminar on theoretical physics, and membership on the editorial boards of many leading Soviet and foreign journals and in various scholarly and scientific councils--this is far from a complete list of his public duties.

Not limiting himself to questions in physics and astronomy, V.L. Ginzburg often turns to working on problems of the sociology, history, and methodology



of science, problems of school instruction, and questions of the sources and roots of bureaucracy, which are very important at the present stage.

The election of V.L. Ginzburg as a member of a number of foreign scientific organizations was international recognition of his services.

In the salutatory address the Presidium of the USSR Academy of Sciences wished the celebrator good health and success, as well as expressed confidence that he will maintain his colossal creative energy and capacity for work for many years.

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GEORGIY SERGEYEVICH BYUSHGENS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 135

[Article under the rubric "News Items and Information": "Academician G.S. Byushgens Is 70 Years Old"]

[Text] Georgiy Sergeyevich Byushgens, Hero of Socialist Labor and Lenin Prize winner, is renowned as a prominent scientist who has made a great contribution to the development of the dynamics and control systems of modern aircraft.

The important research on the stability and controllability of subsonic and supersonic aircraft of different aerodynamic schemes, which was carried out under his supervision and with his direct participation, in many respects contributed to the development of domestic aviation technology.

G.S. Byushgens is successfully combining the activity of a scientist and organizer of science with much pedagogical work, being head of a chair of the Moscow Physical Technical Institute.

The Presidium of the USSR Academy of Sciences sent the celebrator a salutatory address, in which it wished him good health, many years of life, and further creative successes.

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VILEN ANDREYEVICH ZHARIKOV

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 136

[Article under the rubric "News Items and Information": "Corresponding Member of USSR Academy of Sciences V.A. Zharikov Is 60 Years Old"]

[Text] For services in the development of geological science and the training of scientists and in connection with his 60th birthday Corresponding Member of the USSR Academy of Sciences Vilen Andreyevich Zharikov by the Ukase of the Presidium of the USSR Supreme Soviet of 19 September 1986 was awarded the Order of the October Revolution.

V.A. Zharikov, a leading scientist in the field of physical geochemistry and theoretical and experimental mineralogy and petrology and State Prize winner, worked out a number of fundamental questions of the development of these sciences and established new scientific directions. He conducted basic research on the thermodynamics of geological processes, studied the features of the phase composition and mechanism of deep magma formation, substantiated the ideas of fluid mathematical differentiation as a mechanism of the formation of ore-bearing solutions, conducted theoretical and experimental research on the physicochemical conditions of the formation of skarn deposits and all the main types of metasomatites, and developed a new geochemical model of granitization. He has done much for the study of deposits of the most important minerals and the broadening the country's mineral raw material base.

The scientific collective of the Experimental Mineralogy Institute of the USSR Academy of Sciences, which holds a leading place in this branch of science, was formed under the supervision and with the direct participation of V.A. Zharikov.

V.A. Zharikov is doing much pedagogical work, heading the Geochemistry Chair of Moscow University. He is devoting much time and effort to scientific organizational work, being deputy academic secretary of the Geology, Geophysics, Geochemistry, and Mining Sciences Department of the USSR Academy of Sciences and director of the Experimental Mineralogy Institute of the USSR Academy of Sciences. As a member of the commission of the International Union of Geological Sciences and a council of the International Program of Geological Correlation under UNESCO, V.A. Zharikov actively represents Soviet science in international organizations.

In the salutatory address, which was sent to the celebrator, the Presidium of the USSR Academy of Sciences wished him good health and new great creative successes.

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ARTEM SARKISOVICH SARKISYAN

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 87 pp 136-137

[Article under the rubric "News Items and Information": "Corresponding Member of USSR Academy of Sciences A.S. Sarkisyan Is 60 Years Old"]

[Text] For services in the development of oceanology and the training of scientists and in connection with his 60th birthday Corresponding Member of the USSR Academy of Sciences Artem Sarkisovich Sarkisyan by the Ukase of the Presidium of the USSR Supreme Soviet of 22 September 1986 was awarded the Order of Friendship of Peoples.

The research performed by A.S. Sarkisyan on the dynamics of the ocean are well known to the domestic and foreign scientific community at large. He was the first to use numerical methods to solve problems in this field. The large role of the variability of the temperature and salinity of sea water and the variability of depth in the dynamics of the ocean was convincingly shown in his works.

A.S. Sarkisyan was the first to show that precisely the combined effect of these factors plays a fundamental role in the formation of the integrated circulation of the ocean. Having discovered the role of heat and salt exchange through the ocean's surface with an allowance for the bottom contour, he revealed the mechanism of the formation of currents, temperature fields, and salinity in the world ocean. The diagnostic method and adaptation methods of computing ocean currents, which he developed, have been successfully used for specific computations in lakes, seas, and oceans.

A.S. Sarkisyan was awarded the USSR State Prize for developing the theory and making calculations of the Lomonosov current in the Atlantic Ocean.

A.S. Sarkisyan is supervising important scientific work on the dynamics of the ocean, which is being carried out in the Oceanology Institute imeni P.P. Shirshov of the USSR Academy of Sciences, the Marine Hydrophysics Institute of the Ukrainian SSR Academy of Sciences, the Computer Center of the Siberian Department of the USSR Academy of Sciences, and other scientific institutions of the country. He is carrying out the scientific supervision of research on the numerical simulation of sea currents, which is conducted in the framework of CEMA by Soviet specialists together with scholars from the People's

Republic of Bulgaria, the Polish People's Republic, and the German Democratic Republic.

In the past decade the basic direction of A.S. Sarkisyan's scientific work has been connected with analyzing hydrological observations and, since 1982, analyzing data of observations of the program "Active Energy Zones of the Ocean" ("Razrezy"), the largest hydrometeorological program of the CEMA member countries. He heads an interdepartmental group on numerical simulation within this program.

In the salutatory address, which was sent to the celebrator, the Presidium of the USSR Academy of Sciences wished him new great creative achievements for the good of domestic and world science, good health, happiness, and success in all his endeavors.

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